Drinking Water Surveillance Program

HAWKESBURY WATER TREATMENT PLANT

Annual Report 1989

Ontario
Environment
Environnement

ISSN 1180-2146

HAWKESBURY
WATER TREATMENT PLANT

DRINKING WATER SURVEILLANCE PROGRAM

ANNUAL REPORT 1989

Cette publication technique n'est disponible qu'en anglais.

December 1990

Copyright: Queen's Printer for Ontario, 1990
This publication may be reproduced for non-commercial purposes
with appropriate attribution.

PIBS 1393

EXECUTIVE SUMMARY

DRINKING WATER SURVEILLANCE PROGRAM

HAWKESBURY WATER TREATMENT PLANT
1989 ANNUAL REPORT

The Drinking Water Surveillance Program (DWSP) for Ontario is a monitoring program providing immediate, reliable, current information on drinking water quality. The DWSP officially began in April 1986 and is designed to eventually include all municipal supplies in Ontario. In 1989, there were 65 supplies being monitored.

The Hawkesbury Water Treatment Plant is a package plant that treats water from the Ottawa River. The process consists of coagulation, flocculation and sedimentation using an upflow solids contact clarifier, filtration and disinfection. The Hawkesbury plant has a design capacity of 15.89 X 1000 M^3/day and supplies a population of approximately 10,000.

Water samples from the plant: raw and treated and two distribution system sites were taken on a monthly basis beginning in April and analysed for 160 parameters. Parameters were divided into the following groups: Bacteriological, Inorganic and Physical (Laboratory Chemistry, Field Chemistry and Metals) and Organic (Chloroaromatics, Chlorophenols, Pesticides and PCB, Phenolics, Polynuclear Aromatic Hydrocarbons, Specific Pesticides and Volatiles). Chlorophenols and Specific Pesticides were analysed in June and November only.

A summary of results is shown in Table 1.

The Ontario Drinking Water Objective (ODWO) of 1 FTU for turbidity was exceeded in one treated water sample. The District Officer was notified. All other Inorganic and Physical parameters were below any applicable health related ODWOs.

Of a total of approximately 110 Organic parameters tested for on a monthly basis, none exceeded any health related guidelines.

During 1989 the DWSP sampling results indicated that the Hawkesbury Water Treatment Plant produced good quality water at the plant and this quality was maintained in the distribution system.

TABLE A

DRINKING WATER SURVEILLANCE PROGRAM HAWKESBURY WTP

SUMMARY TABLE BY SCAN

	SCAN	RAW TESTS	RAW POSITIVE	RAW %POSITIVE	TREATED TESTS	TREATED POSITIVE	TREATED %POSITIVE	SITE 1 TESTS	SITE 1 POSITIVE	SITE 1 %POSITIVE	SITE 3 TESTS	SITE 3 POSITIVE	SITE 3 %POSITIVE	SITE 2 TESTS	SITE 2 POSITIVE	SITE 2 %POSITIV
	BACTERIOLOGICAL	21	17	80	27	13	48	24	5	20	3	1	33	21	10	4
	CHEMISTRY (FLD)	29	26	89	52	52	100	89	89	100	12	12	100	71	70	9
	CHEMISTRY (LAB)	180	156	86	180	144	80	280	251	89	35	30	85	235	203	8
	METALS	216	103	47	216	85	39	376	173	46	47	20	42	329	145	4
	CHLOROAROMATICS	84	0	0	112	0	0	98	0	0	14	0	0	70	0	
	CHLOROPHENOLS	6	0	0	6	0	0	.	.	.	.	.	.	.	.	
	PAH	124	0	0	139	0	0	.	.	.	.	.	.	.	.	
	PESTICIDES & PCB	230	0	0	272	0	0	199	0	0	21	0	0	131	0	
	PHENOLICS	9	9	100	9	7	77	.	.	.	.	.	.	.	.	
	SPECIFIC PESTICIDES	32	0	0	26	0	0	7	0	0	1	0	0	5	0	
	VOLATILES	261	0	0	261	25	9	232	22	9	29	3	10	174	18	
TOTAL		1192	311		1300	326		1305	540		162	66		1036	446	

THE ODWO FOR TURBIDITY (1 FTU) WAS EXCEEDED IN ONE TREATED WATER, NO OTHER HEALTH-RELATED GUIDELINES WERE EXCEEDED.

A POSITIVE VALUE DENOTES THAT THE RESULT IS GREATER THAN THE STATISTICAL LIMIT OF DETECTION AND IS QUANTIFIABLE
A '.' INDICATES THAT NO SAMPLE WAS TAKEN

DRINKING WATER SURVEILLANCE PROGRAM

HAWKESBURY WATER TREATMENT PLANT
1989 ANNUAL REPORT

INTRODUCTION

The Drinking Water Surveillance Program (DWSP) for Ontario is a monitoring program providing immediate, reliable, current information on drinking water quality. The DWSP officially began in April 1986 and is designed to eventually include all municipal supplies in Ontario. In 1989, there were 65 supplies being monitored. Appendix A carries a full description of the DWSP.

The DWSP was initiated for the Hawkesbury Water Treatment Plant in April of 1989.

This report contains information and results for 1989.

PLANT DESCRIPTION

The Hawkesbury Water Treatment Plant is a conventional treatment plant that treats water from the Ottawa River. The process consists of coagulation, flocculation and sedimentation in an upflow solids contact clarifier, filtration and disinfection. Calcium Carbonate

is added to adjust the pH. The Hawkesbury plant has a design capacity of 15.89 X 1000 M^3/day and flows for day of sampling ranging from 10.4 x 1000 m^3/day to 13.3 x 1000 m^3/day. The plant serves a population of approximately 10,000.

The plant location is shown in Figure 1. Plant process details, in a block schematic, are shown in Figure 2. General plant information is presented in Table 2.

SAMPLING LOCATIONS

Water samples were obtained from six DWSP approved locations;

i) Raw - The water originated from the lowlift discharge line prior to chlorination and was sampled through stainless steel sample lines. The sample tap is located on the discharge line inside the main building.

ii) Treated - The water originated from the highlift discharge after addition of all treatment chemicals and was sampled through a stainless steel sample line. The sample tap is located on the highlift discharge line.

iii) Site 1 - This site is approximately 2.0 kilometers from the plant. Water is sampled through copper plumbing , the sample tap is located at the kitchen sink.

iv) Site 2 - The distance of this site from the plant is unavailable as is the house plumbing and sample tap location.

v) Site 3 - The distance of this site from the plant is unavailable, as is the house plumbing and sample tap location.

vi) Site 4 - This site is approximately 4.0 kilometers from the plant. The sample tap location and type of plumbing is unavailable. Sampling at this site was stopped in May.

SAMPLING AND ANALYSIS

Sample lines in the plant were flushed prior to sampling to ensure that the water obtained was indicative of its origin and not residual water standing in the sample line.

At all distribution system locations two types of samples were obtained: a standing and a free flow. The standing sample consisted of water that had been in the household plumbing and service connection for a minimum of six hours. These samples are used to

make an assessment of the amount by which the levels of inorganic compounds and metals may be changed on standing, due to leaching from (or deposition on), the plumbing system. The only analysis carried out on the standing samples therefore, are General Chemistry and Metals. The free flow sample represented fresh water from the distribution main that had been flowing at the sample tap for five minutes before being sampled.

Attempts were made to capture the same block of water at each sampling point by taking the retention time into consideration. The retention time was calculated by dividing the volume of water between the two sampling points by the sample day flow. For example, if it was determined that the retention time within the plant was five hours then there would be a five hour interval between the raw and treated sampling. Similarly, if it was estimated that it took approximately one day for the water to travel from the plant to the distribution system site, this site would be sampled one day after the treated water from the plant.

Stringent DWSP sampling protocols were followed to ensure that all samples were taken in a uniform manner.

Plant operating personnel perform analyses on parameters for process control (Table 1).

FIGURE 1

DRINKING WATER SURVEILLANCE PROGRAM

SITE LOCATION MAP

HAWKESBURY WATER TREATMENT PLANT

FIGURE 2

HAWKESBURY WTP

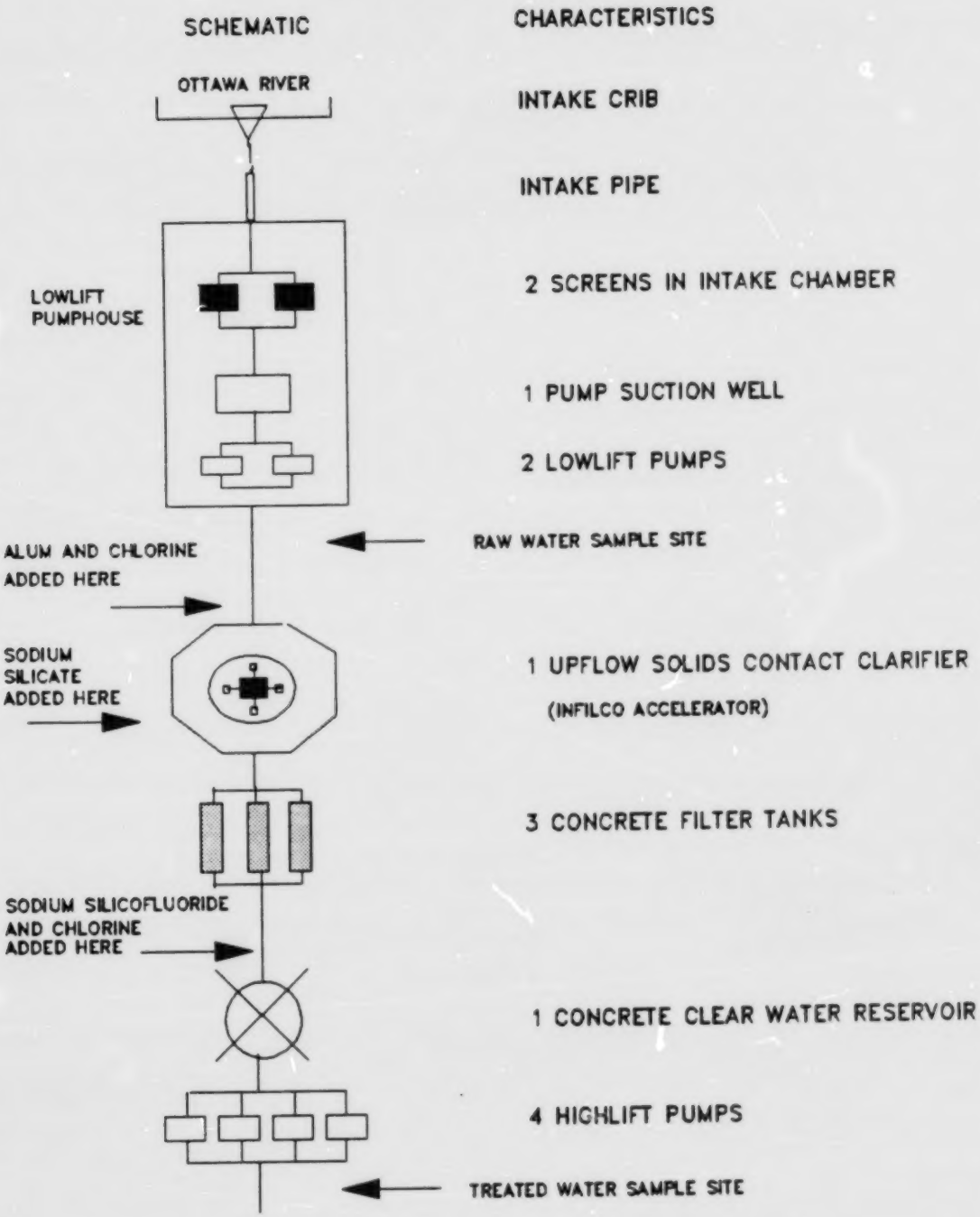

TABLE 1

DRINKING WATER SURVEILLANCE PROGRAM ANNUAL REPORT

IN-PLANT MONITORING HAWKESBURY WATER TREATMENT PLANT 1989

PARAMETER	LOCATION	FREQUENCY
Aluminum	Accelator	daily
	Treated water	daily
Chlorine residual - free	Treated water	twice daily
total	Treated water	continuous
Colour	Raw water	twice daily
	Treated water	twice daily
Fluoride	Treated water	continuous daily
pH	Raw water	twice daily
	After filters	twice daily
	At accelator	twice daily
	Treated water	twice daily
Temperature	Raw water	twice daily
	Treated water	twice daily
Turbidity	Raw water	twice daily
	Afer filters	continuous twice daily
	Treated water	twice daily

TABLE 2

DRINKING WATER SURVEILLANCE PROGRAM ANNUAL REPORT

GENERAL INFORMATION

HAWKESBURY WATER TREATMENT PLANT

LOCATION:	670 MAIN STREET W HAWKESBURY, ONTARIO K6A 1V9 (613-764-5678)
SOURCE:	RAW WATER SOURCE - OTTAWA RIVER
DESIGN CAPACITY:	15.9 x 1000M^3/DAY
OPERATION:	MUNICIPAL
PLANT SUPERINTENDENT:	R. GUERTAIN
MINISTRY REGION:	SOUTHEAST
DISTRICT OFFICER:	MR. G. McKENNA

MUNICIPALITY SERVED	POPULATION
HAWKESBURY	9,666

The Hawkesbury Water Treatment Plant, raw and treated water and two distribution system locations were sampled for approximately 160 parameters on a monthly basis beginning in April. The Specific Pesticides and Chlorophenols scans were sampled in June and The Hawkesbury Water Treatment Plant, raw and treated water and two distribution system locations were sampled for approximately 180 parameters. Chlorophenols and Specific Pesticides were analysed in November only. Polynuclear Aromatic Hydrocarbons and Phenolics are only analysed in the raw and treated water at the plant.

RESULTS

Field measurements were recorded on the day of sampling and were entered onto the DWSP data base as submitted by plant personnel.

Table 3 contains information on the sample day retention time, flow rate and treatment chemicals used and their associated dosages.

Table 4 is a summary break-down of the number of water samples analysed by parameter and by water type. The number of times that a positive or trace result was detected is also reported.

Positive denotes that the result is greater than the statistical limit of detection established by the Ministry of the Environment (MOE) laboratory staff and is quantifiable. Trace (<T) denotes that the level measured is greater than the lowest value detectable

by the method but lies so close to the detection limit that it cannot be confidently quantified.

Table 5 presents the results for parameters detected on at least one occasion.

Table 6 lists all parameters analysed in the DWSP.

Associated guidelines and detection limits are also supplied on tables 5 and 6. Parameters are listed alphabetically within each scan.

DISCUSSION

General

Water quality is judged by comparison with the Ontario Drinking Water Objectives (ODWO's) as defined in the 1984 publication (ISBN 0-7743-8985-0). The Province of Ontario has health related and aesthetic objectives for 49 parameters, these are currently under review. When an ODWO is not available guidelines/limits from other agencies are consulted. The Parameter Listing System (PALIS), recently published (ISBN 0-7729-4461-X) by the MOE, catalogues and keeps current over 1750 guidelines for 650 parameters from agencies throughout the world.

Many of the compounds detected are naturally occuring or are

treatment by-products.

Plant operational personnel address occurrences of taste and odour or biological water quality parameters. The DWSP does not assess these aspects of the water supply.

As stated under Results, traces do not indicate quantifiable results as defined by established MOE laboratory analytical reporting protocols. While they can be useful in trend analysis or confirmation of the presence of a specific contaminant that is repeatedly detected at these levels, the occasional finding of a trace level of a contaminant is not considered to be significant. **DISCUSSION OF GUIDELINES AND LIMITS THEREFORE, IS ONLY CONDUCTED ON POSITIVE RESULTS.**

Bacteriology

Positive results for the Bacteriology scan were present thirteen times in the treated water, five times in the Site 1 water, ten times in the Site 2 water, once in the Site 3 water and twice in the Site 4 water. The positive parameters were Standard Plate Count Total Coliform and/or Total Coliform Background.

Total Coliforms at 1/100 mL were detected by the membrane filtration test in the April treated water sample and at 2/100 mL in the Site 1 sample. The ODWO for Total Coliforms is 5/100 mL.

Standard Plate Count is a test used to supplement routine analysis for Coliform bacteria. The limit for Standard Plate Count (at 35°C after 48 hours) in the ODWOs is 500 organisms per mL (based on a geometric mean of 5 or more samples). High Standard Plate Counts were present in both of the May treated water samples and in July, in the July Site 1 water, the May, July, September and October Site 2 water and the August Site 3 water. While no indicators of unsafe water were detected at this time, the high Standard Plate Count may generally be a result of the higher temperatures in the summer months. A total Chlorine Residual of at least 0.05 mg/L was detected in all distribution system samples. No samples contained bacteriological results over any applicable health related ODWOs.

Guidelines for bacteriological sampling and testing of a supply are developed to maintain a proper supervision of its bacteriological quality; the routine monitoring program usually requires the taking of multiple samples in a given system. Full interpretation of bacteriological quality cannot be made on the basis of single samples. Further, bacteriological limits were developed in acknowledgement that the presence of coliforms may be detected due to their non-uniform distribution throughout the distribution system and the fact that their enumeration is subject to considerable variation. For these reasons, the occasional finding of low numbers of coliform organisms is not unexpected. Routine bacteriological monitoring, as outlined in the ODWOs is carried out

by the operating authority.

Inorganic and Physical

Laboratory and Field Chemistry

The aesthetic ODWO of 5 True Colour Units (TCU) was exceeded in four treated water samples and six distribution system Site free flow waters. Colour in drinking water may be due to the presence of natural or synthetic organic substances as well as certain metallic ions.

It is desirable that the Temperature of drinking water be less than 15°C; the palatability of water is enhanced by its coolness. A temperature below 15°C will tend to reduce the growth of nuisance organisms and hence minimize associated taste, colour, odour and corrosion problems. The temperature of the delivered water may increase in the distribution system due to the warming effect of the soil in late summer and fall and/or as a result of higher temperatures in the source water. The desired ODWO was exceeded twelve times in the treated waters.

The Langelier Index is used extensively in estimating the corrosion potential of water. An increasingly negative index indicates the increasing possibility of corrosion. It is considered sound engineering practice to maintain a slightly positive Langelier

Index. The Langelier Index for Hawkesbury is consistently negative.

Turbidity in water is caused by the presence of suspended matter such as clay, silt, colloidal particles, plankton and other microscopic organisms. The most important potential health effect of Turbidity is its interference with disinfection in the treatment plant and the maintenance of a chlorine residual. The ODWO of 1 Formazin Turbidity Unit (FTU) was exceeded in the December treated water sample. The District Officer was notified. The turbidity values reported by the laboratory were not confirmed by the field turbidity and according to the protocol for turbidity analyses the field results are considered to be the more accurate.

As part of the treatment plant process, sodium silicofluoride is added to the treated water (Table 3). Where fluoridation is practiced, the Fluoride concentration recommended on the ODWO is 1.2 mg/L, plus or minus 0.2 mg/L. This level was generally not maintained as can be seen in the fluoride values reported on Table 5. In July the sodium silicofluoride dosage was not sufficient to produce the recommended fluoride concentration.

Metals

The results reported for the Metals scan were below any applicable health related ODWOs.

Iron and Manganese levels were lower in the treated water as

compared to the raw water. This is a result of the treatment process. The addition of Alum as a coagulant to the raw water and the resulting coagulation/settling process has been shown to reduce the levels of most metals.

Elevated levels of Copper, Nickel, Lead and Zinc were detected in the standing samples as compared to the free flow distribution samples, indicating that very small quantities of these metals were leached from the household plumbing as the water stood overnight.

The negative Langelier Index indicates potential for corrosion.
At present, there is no evidence that Aluminum is physiologically harmful and no health limit for drinking water has been specified. The measure of residual Aluminum in the treated water is important to indicate the efficiency of the treatment process. The ODWOs indicate that a useful guideline is to maintain a residual below 100 µg/L as Al in the water leaving the plant to avoid problems in the distribution system. Aluminum values exceeded the ODWO operational guideline in nine out of nine treated water samples.

The wide variation in Aluminum values between the raw water and the treated water is an indication of fast changing water quality in the Ottawa River but the fact that aluminum levels in the treated water are higher than in the raw water suggests that the process has not been optimized.

Organic Parameters

Chloroaromatics

The results of the Chloroaromatics scan showed that no chloroaromatics were detected.

Chlorophenols

The results of the Chlorophenols scan showed that two Chlorophenols were detected:

2,3,5,6-Tetrachlorophenol

2,4,6-Trichlorophenol

2,3,4,6 - Tetrachlorophenol was detected at a trace level in one raw water sample.

2,4,6 - Trichlorophenol was detected at trace levels, once in the raw water and once in the treated water.

The maximum desirable concentration of phenolic substances in drinking water is 2.0 µg/L. This limit has been set primarily to prevent the occurrence of undesirable tastes and odours, particularly in chlorinated water. Phenolics were detected at levels ranging from 1.2 to 6.6 µg/L in the raw water and 1.0 to 3.0 µg/L in the treated water.

Pesticides and PCB (Polychlorinated Biphenyls)

The results of the Pesticides and PCB scan showed that no PCBs were detected and that one pesticide was detected:

Alpha BHC

There are several isomers of BHC (Benzene Hexachloride); gamma BHC is the active ingredient of the pesticide Lindane; while alpha BHC is the isomer predominantly found in surface waters from the Great Lakes Basin as indicated in results from other water supplies on DWSP.

Alpha BHC was detected at trace levels, once in the raw water, twice in the treated water, once in the Site 1 water and once in the Site 2 water.

Specific Pesticides

Results of the Specific Pesticides scan showed that no specific pesticides were detected.

Polynuclear Aromatic Hydrocarbons (PAHs)

The results of the PAH scan showed that no PAHs were detected.

Volatiles

The results of the Volatiles scan showed that nine parameters, other than Trihalomethanes(THMs), were detected:

Benzene

Toluene

Ethylbenzene

O-Xylene

Styrene

1,1,1 Trichloroethane

Trichloroethylene

Tetrachloroethylene

1,4-Dichlorobenzene

Benzene was detected at trace levels, once in the treated water and once in the Site 1 water.

The detection of toluene at low, trace levels is a laboratory artifact derived from the analytical methodology.

Ethylbenzene was detected at trace levels, three times in the treated water, once in the Site 1 water, once in the Site 2 water and once in the Site 4 water.

Ortho-Xylene (O-Xylene) was detected at trace levels, once in the Site 1 water and once in the Site 2 water.

The detected trace levels of Styrene are also considered to be laboratory artifacts resulting from the polystyrene shipping containers. The sporadic background levels from this source are in

the order of 0.05 µg/L.

The volatiles listed above are typically found on an occasional basis at other water supplies included on the DWSP.

1,1,1 Trichloroethane was detected at trace levels, twice in the raw water, once in the treated water, once in the Site 1 water and once in the Site 2 water.

Trichloroethylene was detected at a trace level in the Site 2 water.

Tetrachloroethylene was detected at a trace level, once in the treated water, once in the Site 1 water and once in the Site 4 water.

1,4-Dichlorobenzene was detected at a trace level in the Site 1 water.

THMs are acknowledged to be produced during the water treatment process and will always occur in chlorinated surface waters. THMs are comprised of Chloroform, Chlorodibromomethane and Dichlorobromomethane. Bromoform occurs occasionally. Results are reported for the individual compounds as well as for total THMs.

Chloroform, Dichlorobromomethane and Total THMs were detected in

all treated water samples. Chlorodibromomethane was detected at trace levels, twice in the treated water, twice in the Site 1 water and once in the Site 2 water. Bromoform was not detected. All Total THM occurrences, ranging from 27.2 to 103.9 µg/L were well below the ODWO of 350 µg/L.

CONCLUSIONS

The Hawkesbury Water Treatment Plant for the sample year of 1989 produced good quality water and this quality was maintained in the distribution system.

The health related ODWO for Turbidity was exceeded in one treated water sample. No other health related guidelines were exceeded during 1989.

RECOMMENDATIONS

Two recommendations can be made:

1) The reason for elevated Aluminum levels in treated water samples should be investigated. The plant processes may need to be optimized.

2) Fluoride dosage should be adjusted so that the recommended concentration is maintained.

TABLE 3

DRINKING WATER SURVEILLANCE PROGRAM HAWKESBURY WTP SAMPLE DAY CONDITIONS FOR 1989

	SAMPLE DAY CONDITIONS		TREATMENT CHEMICAL DOSAGES (MG/L)					
			COAGULATION	PRE-CHLORINATION	COAGULATION AID	FLUORIDATION	POST PH ADJUSTMEN	POST-CHLORINATION
			ALUM LIQUID	CHLORINE	SODIUM SILICATE	SODIUM SILICOFLUORIDE	CALCIUM CARBONATE	CHLORINE
DATE	DELAY* TIME(HRS)	FLOW (1000M3)						
APR 05	5.0	10.4	35.00	.	1.50	1.30	14.00	.86
MAY 02	3.4	10.9	32.17	.	1.20	1.32	13.63	.91
MAY 31	2.6	13.3	28.60	.50	.89	1.00	14.76	1.41
JUL 04	5.9	12.8	28.00	.80	.90	.52	14.20	1.50
AUG 09	5.9	12.6	25.00	.	.96	1.00	12.00	2.30
SEP 06	5.8	12.8	27.16	.	.96	1.20	13.52	1.40
OCT 03	3.8	12.0	27.88	.79	1.00	1.00	11.84	1.20
NOV 14	3.5	11.3	33.00	.	1.14	1.30	15.50	1.50
DEC 12	6.0	12.4	37.90	.	1.29	1.10	12.15	1.02

* THE DELAY TIME BETWEEN THE RAW AND TREATED WATER SAMPLING, SHOULD ESTIMATE THE RETENTION TIME.

TABLE 4

DRINKING WATER SURVEILLANCE PROGRAM HAWKESBURY

SUMMARY TABLE OF RESULTS (1989)

SCAN	PARAMETER	RAW			TREATED			SITE 1			SITE 3			SITE 2			SITE 4		
		TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
BACTERIOLOGICAL	FECAL COLIFORM MF	7	5	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	STANDRD PLATE CNT MF	.	.	.	9	8	0	8	3	0	1	1	0	7	5	0	2	2	0
	TOTAL COLIFORM MF	7	5	0	9	1	0	8	1	0	1	0	0	7	0	0	2	0	0
	T COLIFORM BCKGRD MF	7	7	0	9	4	0	8	1	0	1	0	0	7	5	0	2	0	0
*TOTAL SCAN BACTERIOLOGICAL		21	17	0	27	13	0	24	5	0	3	1	0	21	10	0	6	2	0
*TOTAL GROUP BACTERIOLOGICAL		21	17	0	27	13	0	24	5	0	3	1	0	21	10	0	6	2	0
CHEMISTRY (FLD)	FLD CHLORINE (COMB)	1	0	0	9	9	0	15	15	0	2	2	0	14	13	0	2	2	0
	FLD CHLORINE FREE	1	0	0	9	9	0	15	15	0	2	2	0	14	14	0	4	4	0
	FLD CHLORINE (TOTAL)	1	0	0	9	9	0	16	16	0	2	2	0	12	12	0	4	4	0
	FLD PH	9	9	0	9	9	0	15	15	0	2	2	0	14	14	0	4	4	0
	FLD TEMPERATURE	8	8	0	7	7	0	16	16	0	2	2	0	13	13	0	4	4	0
	FLD TURBIDITY	9	9	0	9	9	0	12	12	0	2	2	0	4	4	0	2	2	0
*TOTAL SCAN CHEMISTRY (FLD)		29	26	0	52	52	0	89	89	0	12	12	0	71	70	0	20	20	0
CHEMISTRY (LAB)	ALKALINITY	9	9	0	9	9	0	16	16	0	2	2	0	13	13	0	4	4	0
	CALCIUM	9	9	0	9	9	0	16	16	0	2	2	0	14	14	0	4	4	0
	CYANIDE	9	0	0	9	0	1	8	0	0	1	0	0	7	0	0	2	0	0
	CHLORIDE	9	9	0	9	9	0	16	16	0	2	2	0	13	13	0	4	4	0
	COLOUR	9	9	0	9	9	0	16	16	0	2	2	0	13	13	0	4	4	0
	CONDUCTIVITY	9	9	0	9	9	0	16	16	0	2	2	0	13	13	0	4	4	0

TABLE 4

DRINKING WATER SURVEILLANCE PROGRAM HAWKESBURY

SUMMARY TABLE OF RESULTS (1989)

SCAN	PARAMETER	SITE RAW TOTAL	RAW POSITIVE	RAW TRACE	TREATED TOTAL	TREATED POSITIVE	TREATED TRACE	SITE 1 TOTAL	SITE 1 POSITIVE	SITE 1 TRACE	SITE 3 TOTAL	SITE 3 POSITIVE	SITE 3 TRACE	SITE 2 TOTAL	SITE 2 POSITIVE	SITE 2 TRACE	SITE 4 TOTAL	SITE 4 POSITIVE	SITE 4 TRACE
CHEMISTRY (LAB)	FLUORIDE	9	6	3	9	9	0	16	16	0	2	2	0	13	13	0	4	4	0
	HARDNESS	9	9	0	9	9	0	16	16	0	2	2	0	14	14	0	4	4	0
	IONCAL	9	9	0	9	9	0	16	16	0	2	2	0	14	13	0	4	4	0
	LANGELIERS INDEX	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	MAGNESIUM	9	9	0	9	9	0	16	16	0	2	2	0	14	14	0	4	4	0
	SODIUM	9	9	0	9	9	0	16	16	0	2	2	0	14	14	0	4	4	0
	AMMONIUM TOTAL	9	3	5	9	1	5	16	7	7	2	0	2	13	2	7	4	2	2
	NITRITE	9	8	1	9	1	6	16	4	11	2	0	0	13	0	11	4	1	3
	TOTAL NITRATES	9	9	0	9	9	0	16	16	0	2	2	0	13	13	0	4	4	0
	NITROGEN TOT KJELD	9	9	0	9	9	0	16	16	0	2	2	0	14	14	0	4	4	0
	PH	9	9	0	9	9	0	16	16	0	2	2	0	13	13	0	4	4	0
	PHOSPHORUS FIL REACT	9	4	5	9	4	4	.	.	.	.	.	.	.	.	.	.	.	.
	PHOSPHORUS TOTAL	9	9	0	9	3	6	.	.	.	.	.	.	.	.	.	.	.	.
	SULPHATE	9	9	0	9	9	0	16	16	0	2	2	0	14	14	0	4	4	0
	TURBIDITY	9	9	0	9	9	0	16	16	0	2	2	0	13	13	0	4	4	0
*TOTAL SCAN CHEMISTRY (LAB)		180	156	14	180	144	22	280	251	18	35	30	2	235	203	18	70	63	5
METALS	SILVER	9	0	2	9	0	3	16	0	4	2	0	1	14	0	3	4	0	2
	ALUMINUM	9	9	0	9	9	0	16	16	0	2	2	0	14	14	0	4	4	0
	ARSENIC	9	2	7	9	0	9	16	0	16	2	0	2	14	0	13	4	0	4
	BARIUM	9	9	0	9	9	0	16	16	0	2	2	0	14	14	0	4	4	0
	BORON	9	2	7	9	0	9	16	2	14	2	0	2	14	0	14	4	1	3
	BERYLLIUM	9	0	4	9	0	2	16	0	3	2	0	0	14	0	5	4	0	1

TABLE 4

DRINKING WATER SURVEILLANCE PROGRAM HAWKESBURY

SUMMARY TABLE OF RESULTS (1989)

SCAN	PARAMETER	SITE RAW TOTAL	RAW POSITIVE	RAW TRACE	TREATED TOTAL	TREATED POSITIVE	TREATED TRACE	SITE 1 TOTAL	SITE 1 POSITIVE	SITE 1 TRACE	SITE 3 TOTAL	SITE 3 POSITIVE	SITE 3 TRACE	SITE 2 TOTAL	SITE 2 POSITIVE	SITE 2 TRACE	SITE 4 TOTAL	SITE 4 POSITIVE	SITE 4 TRACE
METALS	CADMIUM	9	0	2	9	0	2	16	0	4	2	0	0	14	0	1	4	0	3
	COBALT	9	0	9	9	0	8	16	0	15	2	0	2	14	0	14	4	0	4
	CHROMIUM	9	7	0	9	1	4	16	5	7	2	0	2	14	0	7	4	1	1
	COPPER	9	8	1	9	6	3	16	16	0	2	2	0	14	14	0	4	4	0
	IRON	9	8	1	9	2	7	16	6	10	2	0	2	14	5	9	4	3	1
	MERCURY	9	0	2	9	0	3	8	1	2	1	0	0	7	0	2	2	0	0
	MANGANESE	9	8	1	9	9	0	16	16	0	2	2	0	14	14	0	4	4	0
	MOLYBDENUM	9	0	9	9	1	8	16	1	15	2	0	2	14	1	13	4	0	4
	NICKEL	9	0	8	9	0	6	16	3	10	2	0	2	14	3	8	4	0	4
	LEAD	9	7	2	9	3	4	16	14	2	2	2	0	14	13	1	4	4	0
	ANTIMONY	9	8	1	9	9	0	16	14	2	2	2	0	14	12	2	4	4	0
	SELENIUM	9	0	3	9	0	3	16	0	5	2	0	2	14	0	5	4	0	3
	STRONTIUM	9	9	0	9	9	0	16	16	0	2	2	0	14	14	0	4	4	0
	TITANIUM	9	9	0	9	9	0	16	16	0	2	2	0	14	14	0	4	4	0
	THALLIUM	9	0	4	9	0	1	16	0	6	2	0	0	14	0	2	4	2	0
	URANIUM	9	2	7	9	0	5	16	0	6	2	0	2	14	1	4	4	0	0
	VANADIUM	9	7	2	9	9	0	16	15	1	2	2	0	14	12	2	4	4	0
	ZINC	9	8	1	9	9	0	16	16	0	2	2	0	14	14	0	4	4	0
*TOTAL SCAN METALS		216	103	73	216	85	77	376	173	122	47	20	19	329	145	105	94	47	30
*TOTAL GROUP INORGANIC & PHYSICAL		425	285	87	448	281	99	745	513	140	94	62	21	635	418	123	184	130	35
CHLOROAROMATICS	HEXACHLOROBUTADIENE	6	0	0	8	0	0	7	0	0	1	0	0	5	0	0	2	0	0
	123 TRICHLOROBENZENE	6	0	0	8	0	0	7	0	0	1	0	0	5	0	0	2	0	0

TABLE 4

DRINKING WATER SURVEILLANCE PROGRAM HAWKESBURY

SUMMARY TABLE OF RESULTS (1989)

SCAN	PARAMETER	SITE RAW TOTAL	RAW POSITIVE	RAW TRACE	TREATED TOTAL	TREATED POSITIVE	TREATED TRACE	SITE 1 TOTAL	SITE 1 POSITIVE	SITE 1 TRACE	SITE 3 TOTAL	SITE 3 POSITIVE	SITE 3 TRACE	SITE 2 TOTAL	SITE 2 POSITIVE	SITE 2 TRACE	SITE 4 TOTAL	SITE 4 POSITIVE	SITE 4 TRACE
CHLOROAROMATICS	1234 T-CHLOROBENZENE	6	0	0	8	0	0	7	0	0	1	0	0	5	0	0	2	0	0
	1235 T-CHLOROBENZENE	6	0	0	8	0	0	7	0	0	1	0	0	5	0	0	2	0	0
	124 TRICHLOROBENZENE	6	0	0	8	0	0	7	0	0	1	0	0	5	0	0	2	0	0
	1245 T-CHLOROBENZENE	6	0	0	8	0	0	7	0	0	1	0	0	5	0	0	2	0	0
	135 TRICHLOROBENZENE	6	0	0	8	0	0	7	0	0	1	0	0	5	0	0	2	0	0
	HCB	6	0	0	8	0	0	7	0	0	1	0	0	5	0	0	2	0	0
	HEXACHLOROETHANE	6	0	0	8	0	0	7	0	0	1	0	0	5	0	0	2	0	0
	OCTACHLOROSTYRENE	6	0	0	8	0	0	7	0	0	1	0	0	5	0	0	2	0	0
	PENTACHLOROBENZENE	6	0	0	8	0	0	7	0	0	1	0	0	5	0	0	2	0	0
	236 TRICHLOROTOLUENE	6	0	0	8	0	0	7	0	0	1	0	0	5	0	0	2	0	0
	245 TRICHLOROTOLUENE	6	0	0	8	0	0	7	0	0	1	0	0	5	0	0	2	0	0
	26A TRICHLOROTOLUENE	6	0	0	8	0	0	7	0	0	1	0	0	5	0	0	2	0	0
*TOTAL SCAN CHLOROAROMATICS		84	0	0	112	0	0	98	0	0	14	0	0	70	0	0	28	0	0
CHLOROPHENOLS	234 TRICHLOROPHENOL	1	0	0	1	0	0	.	.	.	.	.	.	.	.	.	.	.	.
	2345 T-CHLOROPHENOL	1	0	0	1	0	0	.	.	.	.	.	.	.	.	.	.	.	.
	2356 T-CHLOROPHENOL	1	0	1	1	0	0	.	.	.	.	.	.	.	.	.	.	.	.
	245-TRICHLOROPHENOL	1	0	0	1	0	0	.	.	.	.	.	.	.	.	.	.	.	.
	246-TRICHLOROPHENOL	1	0	1	1	0	1	.	.	.	.	.	.	.	.	.	.	.	.
	PENTACHLOROPHENOL	1	0	0	1	0	0	.	.	.	.	.	.	.	.	.	.	.	.
*TOTAL SCAN CHLOROPHENOLS		6	0	2	6	0	1	0	0	0	0	0	0	0	0	0	0	0	0

TABLE 4

DRINKING WATER SURVEILLANCE PROGRAM HAWKESBURY

SUMMARY TABLE OF RESULTS (1989)

SCAN	PARAMETER	SITE RAW TOTAL	RAW POSITIVE	RAW TRACE	TREATED TOTAL	TREATED POSITIVE	TREATED TRACE	SITE 1 TOTAL	SITE 1 POSITIVE	SITE 1 TRACE	SITE 3 TOTAL	SITE 3 POSITIVE	SITE 3 TRACE	SITE 2 TOTAL	SITE 2 POSITIVE	SITE 2 TRACE	SITE 4 TOTAL	SITE 4 POSITIVE	SITE 4 TRACE
PAH	PHENANTHRENE	8	0	0	9	0	0	.	.	.	.	.	.	.	.	.	.	.	.
	ANTHRACENE	8	0	0	9	0	0	.	.	.	.	.	.	.	.	.	.	.	.
	FLUORANTHENE	8	0	0	9	0	0	.	.	.	.	.	.	.	.	.	.	.	.
	PYRENE	8	0	0	9	0	0	.	.	.	.	.	.	.	.	.	.	.	.
	BENZO(A)ANTHRACENE	8	0	0	9	0	0	.	.	.	.	.	.	.	.	.	.	.	.
	CHRYSENE	8	0	0	9	0	0	.	.	.	.	.	.	.	.	.	.	.	.
	DIMETH. BENZ(A)ANTHR	2	0	0	2	0	0	.	.	.	.	.	.	.	.	.	.	.	.
	BENZO(E) PYRENE	8	0	0	9	0	0	.	.	.	.	.	.	.	.	.	.	.	.
	BENZO(B) FLUORANTHEN	8	0	0	9	0	0	.	.	.	.	.	.	.	.	.	.	.	.
	PERYLENE	8	0	0	9	0	0	.	.	.	.	.	.	.	.	.	.	.	.
	BENZO(K) FLUORANTHEN	8	0	0	9	0	0	.	.	.	.	.	.	.	.	.	.	.	.
	BENZO(A) PYRENE	2	0	0	2	0	0	.	.	.	.	.	.	.	.	.	.	.	.
	BENZO(G,H,I) PERYLEN	8	0	0	9	0	0	.	.	.	.	.	.	.	.	.	.	.	.
	DIBENZO(A,H) ANTHRAC	8	0	0	9	0	0	.	.	.	.	.	.	.	.	.	.	.	.
	INDENO(1,2,3-C,D) PY	8	0	0	9	0	0	.	.	.	.	.	.	.	.	.	.	.	.
	BENZO(B) CHRYSENE	8	0	0	9	0	0	.	.	.	.	.	.	.	.	.	.	.	.
	CORONENE	8	0	0	9	0	0	.	.	.	.	.	.	.	.	.	.	.	.
*TOTAL SCAN PAH		124	0	0	139	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PESTICIDES & PCB	ALDRIN	6	0	0	8	0	0	7	0	0	1	0	0	5	0	0	2	0	0
	ALPHA BHC	6	0	1	8	0	2	7	0	1	1	0	0	5	0	1	2	0	0
	BETA BHC	6	0	0	8	0	0	7	0	0	1	0	0	5	0	0	2	0	0
	LINDANE	6	0	0	8	0	0	7	0	0	1	0	0	5	0	0	2	0	0

TABLE 4

DRINKING WATER SURVEILLANCE PROGRAM HAWKESBURY

SUMMARY TABLE OF RESULTS (1989)

SCAN	PARAMETER	SITE RAW TOTAL	RAW POSITIVE	RAW TRACE	TREATED TOTAL	TREATED POSITIVE	TREATED TRACE	SITE 1 TOTAL	SITE 1 POSITIVE	SITE 1 TRACE	SITE 3 TOTAL	SITE 3 POSITIVE	SITE 3 TRACE	SITE 2 TOTAL	SITE 2 POSITIVE	SITE 2 TRACE	SITE 4 TOTAL	SITE 4 POSITIVE	SITE 4 TRACE
PESTICIDES & PCB	ALPHA CHLORDANE	6	0	0	8	0	0	7	0	0	1	0	0	5	0	0	2	0	0
	GAMMA CHLORDANE	6	0	0	8	0	0	7	0	0	1	0	0	5	0	0	2	0	0
	DIELDRIN	6	0	0	8	0	0	7	0	0	1	0	0	5	0	0	2	0	0
	METHOXYCHLOR	6	0	0	8	0	0	7	0	0	1	0	0	5	0	0	2	0	0
	ENDOSULFAN 1	6	0	0	8	0	0	7	0	0	1	0	0	5	0	0	2	0	0
	ENDOSULFAN II	6	0	0	8	0	0	7	0	0	1	0	0	5	0	0	2	0	0
	ENDRIN	6	0	0	8	0	0	7	0	0	1	0	0	5	0	0	2	0	0
	ENDOSULFAN SULPHATE	6	0	0	8	0	0	7	0	0	1	0	0	5	0	0	2	0	0
	HEPTACHLOR EPOXIDE	6	0	0	8	0	0	7	0	0	1	0	0	5	0	0	2	0	0
	HEPTACHLOR	6	0	0	8	0	0	7	0	0	1	0	0	5	0	0	2	0	0
	MIREX	6	0	0	8	0	0	7	0	0	1	0	0	5	0	0	2	0	0
	OXYCHLORDANE	6	0	0	8	0	0	7	0	0	1	0	0	5	0	0	2	0	0
	OPDDT	6	0	0	8	0	0	7	0	0	1	0	0	5	0	0	2	0	0
	PCB	6	0	0	8	0	0	7	0	0	1	0	0	5	0	0	2	0	0
	DDD	6	0	0	8	0	0	7	0	0	1	0	0	5	0	0	2	0	0
	PPDDE	6	0	0	8	0	0	7	0	0	1	0	0	5	0	0	2	0	0
	PPDDT	6	0	0	8	0	0	7	0	0	1	0	0	5	0	0	2	0	0
	AMETRINE	8	0	0	8	0	0	4	0	0	.	.	.	2	0	0	2	0	0
	ATRAZINE	8	0	0	8	0	0	4	0	0	.	.	.	2	0	0	2	0	0
	ATRATONE	8	0	0	8	0	0	4	0	0	.	.	.	2	0	0	2	0	0
	CYANAZINE	8	0	0	8	0	0	4	0	0	.	.	.	2	0	0	2	0	0
	D-ETHYL ATRAZINE	8	0	0	8	0	0	4	0	0	.	.	.	2	0	0	2	0	0
	DES ETHYL SIMAZINE	8	0	0	8	0	0	4	0	0	.	.	.	2	0	0	2	0	0
	PROMETONE	8	0	0	8	0	0	4	0	0	.	.	.	2	0	0	2	0	0
	PROPAZINE	8	0	0	8	0	0	4	0	0	.	.	.	2	0	0	2	0	0

TABLE 4

DRINKING WATER SURVEILLANCE PROGRAM HAWKESBURY

SUMMARY TABLE OF RESULTS (1989)

SCAN	PARAMETER	SITE RAW TOTAL	RAW POSITIVE	RAW TRACE	TREATED TOTAL	TREATED POSITIVE	TREATED TRACE	SITE 1 TOTAL	SITE 1 POSITIVE	SITE 1 TRACE	SITE 3 TOTAL	SITE 3 POSITIVE	SITE 3 TRACE	SITE 2 TOTAL	SITE 2 POSITIVE	SITE 2 TRACE	SITE 4 TOTAL	SITE 4 POSITIVE	SITE 4 TRACE
PESTICIDES & PCB	PROMETRYNE	8	0	0	8	0	0	4	0	0	.	.	.	2	0	0	2	0	0
	METRIBUZIN (SENCOR)	8	0	0	8	0	0	4	0	0	.	.	.	2	0	0	2	0	0
	SIMAZINE	8	0	0	8	0	0	4	0	0	.	.	.	2	0	0	2	0	0
	ALACHLOR	8	0	0	8	0	0	4	0	0	.	.	.	2	0	0	2	0	0
	METOLACHLOR	8	0	0	8	0	0	4	0	0	.	.	.	2	0	0	2	0	0
*TOTAL SCAN PESTICIDES & PCB		230	0	1	272	0	2	199	0	1	21	0	0	131	0	1	68	0	0
PHENOLICS	PHENOLICS	9	9	0	9	7	2	.	.	.	.	.	.	.	.	.	.	.	.
*TOTAL SCAN PHENOLICS		9	9	0	9	7	2	0	0	0	0	0	0	0	0	0	0	0	0
SPECIFIC PESTICIDES	TOXAPHENE	6	0	0	8	0	0	7	0	0	1	0	0	5	0	0	2	0	0
	2,4,5-T	1	0	0	1	0	0	.	.	.	.	.	.	.	.	.	.	.	.
	2,4-D	1	0	0	1	0	0	.	.	.	.	.	.	.	.	.	.	.	.
	2,4-DB	1	0	0	1	0	0	.	.	.	.	.	.	.	.	.	.	.	.
	2,4 D PROPIONIC ACID	0	0	0	0	0	0	.	.	.	.	.	.	.	.	.	.	.	.
	DICAMBA	1	0	0	1	0	0	.	.	.	.	.	.	.	.	.	.	.	.
	PICHLORAM	0	0	0	0	0	0	.	.	.	.	.	.	.	.	.	.	.	.
	SILVEX	1	0	0	1	0	0	.	.	.	.	.	.	.	.	.	.	.	.
	DIAZINON	1	0	0	1	0	0	.	.	.	.	.	.	.	.	.	.	.	.
	DICHLOROVOS	1	0	0	1	0	0	.	.	.	.	.	.	.	.	.	.	.	.
	CHLORPYRIFOS	1	0	0	1	0	0	.	.	.	.	.	.	.	.	.	.	.	.

TABLE 4

DRINKING WATER SURVEILLANCE PROGRAM HAWKESBURY

SUMMARY TABLE OF RESULTS (1989)

SCAN	PARAMETER	SITE RAW TOTAL	RAW POSITIVE	RAW TRACE	TREATED TOTAL	TREATED POSITIVE	TREATED TRACE	SITE 1 TOTAL	SITE 1 POSITIVE	SITE 1 TRACE	SITE 3 TOTAL	SITE 3 POSITIVE	SITE 3 TRACE	SITE 2 TOTAL	SITE 2 POSITIVE	SITE 2 TRACE	SITE 4 TOTAL	SITE 4 POSITIVE	SITE 4 TRACE
SPECIFIC PESTICIDES	ETHION	1	0	0	1	0	0	.	.	.	.	.	.	.	.	.	.	.	.
	AZINPHOS-METHYL	1	0	0	1	0	0	.	.	.	.	.	.	.	.	.	.	.	.
	MALATHION	1	0	0	1	0	0	.	.	.	.	.	.	.	.	.	.	.	.
	MEVINPHOS	1	0	0	1	0	0	.	.	.	.	.	.	.	.	.	.	.	.
	METHYL PARATHION	1	0	0	1	0	0	.	.	.	.	.	.	.	.	.	.	.	.
	METHYLTRITHION	1	0	0	1	0	0	.	.	.	.	.	.	.	.	.	.	.	.
	PARATHION	1	0	0	1	0	0	.	.	.	.	.	.	.	.	.	.	.	.
	PHORATE	1	0	0	1	0	0	.	.	.	.	.	.	.	.	.	.	.	.
	RELDAN	1	0	0	1	0	0	.	.	.	.	.	.	.	.	.	.	.	.
	RONNEL	1	0	0	1	0	0	.	.	.	.	.	.	.	.	.	.	.	.
	AMINOCARB	0	0	0	0	0	0	.	.	.	.	.	.	.	.	.	.	.	.
	BENOMYL	0	0	0	0	0	0	.	.	.	.	.	.	.	.	.	.	.	.
	BUX	0	0	0	0	0	0	.	.	.	.	.	.	.	.	.	.	.	.
	CARBOFURAN	1	0	0	0	0	0	.	.	.	.	.	.	.	.	.	.	.	.
	CICP	1	0	0	0	0	0	.	.	.	.	.	.	.	.	.	.	.	.
	DIALLATE	1	0	0	0	0	0	.	.	.	.	.	.	.	.	.	.	.	.
	EPTAM	1	0	0	0	0	0	.	.	.	.	.	.	.	.	.	.	.	.
	IPC	1	0	0	0	0	0	.	.	.	.	.	.	.	.	.	.	.	.
	PROPOXUR	1	0	0	0	0	0	.	.	.	.	.	.	.	.	.	.	.	.
	CARBARYL	1	0	0	0	0	0	.	.	.	.	.	.	.	.	.	.	.	.
	BUTYLATE	1	0	0	0	0	0	.	.	.	.	.	.	.	.	.	.	.	.
*TOTAL SCAN SPECIFIC PESTICIDES		32	0	0	26	0	0	7	0	0	1	0	0	5	0	0	2	0	0
VOLATILES	BENZENE	9	0	0	9	0	1	8	0	1	1	0	0	6	0	0	2	0	0

TABLE 4

DRINKING WATER SURVEILLANCE PROGRAM HAWKESBURY

SUMMARY TABLE OF RESULTS (1989)

SCAN	PARAMETER	SITE RAW TOTAL	RAW POSITIVE	RAW TRACE	TREATED TOTAL	TREATED POSITIVE	TREATED TRACE	SITE 1 TOTAL	SITE 1 POSITIVE	SITE 1 TRACE	SITE 3 TOTAL	SITE 3 POSITIVE	SITE 3 TRACE	SITE 2 TOTAL	SITE 2 POSITIVE	SITE 2 TRACE	SITE 4 TOTAL	SITE 4 POSITIVE	SITE 4 TRACE
VOLATILES	TOLUENE	9	0	0	9	0	5	8	0	5	1	0	1	6	0	2	2	0	0
	ETHYLBENZENE	9	0	0	9	0	3	8	0	1	1	0	0	6	0	1	2	0	1
	P-XYLENE	9	0	0	9	0	0	8	0	0	1	0	0	6	0	0	2	0	0
	M-XYLENE	9	0	0	9	0	0	8	0	0	1	0	0	6	0	0	2	0	0
	O-XYLENE	9	0	0	9	0	0	8	0	1	1	0	0	6	0	1	2	0	0
	STYRENE	9	0	1	9	0	8	8	0	5	1	0	1	6	0	5	2	0	2
	1,1 DICHLOROETHYLENE	9	0	0	9	0	0	8	0	0	1	0	0	6	0	0	2	0	0
	METHYLENE CHLORIDE	9	0	0	9	0	0	8	0	0	1	0	0	6	0	0	2	0	0
	T1,2DICHLOROETHYLENE	9	0	0	9	0	0	8	0	0	1	0	0	6	0	0	2	0	0
	1,1 DICHLOROETHANE	9	0	0	9	0	0	8	0	0	1	0	0	6	0	0	2	0	0
	CHLOROFORM	9	0	7	9	9	0	8	8	0	1	1	0	6	6	0	2	2	0
	111, TRICHLOROETHANE	9	0	2	9	0	1	8	0	1	1	0	0	6	0	1	2	0	0
	1,2 DICHLOROETHANE	9	0	0	9	0	0	8	0	0	1	0	0	6	0	0	2	0	0
	CARBON TETRACHLORIDE	9	0	0	9	0	0	8	0	0	1	0	0	6	0	0	2	0	0
	1,2 DICHLOROPROPANE	9	0	0	9	0	0	8	0	0	1	0	0	6	0	1	2	0	0
	TRICHLOROETHYLENE	9	0	0	9	0	0	8	0	0	1	0	0	6	0	1	2	0	0
	DICHLOROBROMOMETHANE	9	0	0	9	8	1	8	7	1	1	1	0	6	6	0	2	1	1
	112 TRICHLOROETHANE	9	0	0	9	0	0	8	0	0	1	0	0	6	0	0	2	0	0
	CHLORODIBROMOMETHANE	9	0	0	9	0	2	8	0	2	1	0	0	6	0	1	2	0	0
	T-CHLOROETHYLENE	9	0	0	9	0	1	8	0	1	1	0	0	6	0	0	2	0	1
	BROMOFORM	9	0	0	9	0	0	8	0	0	1	0	0	6	0	0	2	0	0
	1122 T-CHLOROETHANE	9	0	0	9	0	0	8	0	0	1	0	0	6	0	0	2	0	0
	CHLOROBENZENE	9	0	0	9	0	0	8	0	0	1	0	0	6	0	0	2	0	0
	1,4 DICHLOROBENZENE	9	0	0	9	0	0	8	0	1	1	0	0	6	0	0	2	0	0
	1,3 DICHLOROBENZENE	9	0	0	9	0	0	8	0	0	1	0	0	6	0	0	2	0	0

TABLE 4

DRINKING WATER SURVEILLANCE PROGRAM HAWKESBURY

SUMMARY TABLE OF RESULTS (1989)

SCAN	PARAMETER	SITE	RAW			TREATED			SITE 1			SITE 3			SITE 2			SITE 4		
			TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
VOLATILES	1,2 DICHLOROBENZENE		9	0	0	9	0	0	8	0	0	1	0	0	6	0	0	2	0	0
	ETHLYENE DIBROMIDE		9	0	0	9	0	0	8	0	0	1	0	0	6	0	0	2	0	0
	TOTL TRIHALOMETHANES		9	0	1	9	8	1	8	7	1	1	1	0	6	6	0	2	1	1
*TOTAL SCAN VOLATILES			261	0	11	261	25	23	232	22	20	29	3	2	174	18	12	58	4	6
*TOTAL GROUP ORGANIC			746	9	14	825	32	28	536	22	21	65	3	2	380	18	13	156	4	6
TOTAL			1192	311	101	1300	326	127	1305	540	161	162	66	23	1036	446	136	346	136	41

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM HAWKESBURY WTP 1989

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM							
	RAW	TREATED	SITE 1		SITE 3		SITE 2		SITE 4	
			STANDING	FREE FLOW	STANDING	FREE FLOW	STANDING	FREE FLOW	STANDING	FREE FLOW
	BACTERIOLOGICAL									
FECAL COLIFORM MF (CT/100ML)			DET'N LIMIT = 0		GUIDELINE = 0 (A1)					
APR	296 T24	.	.	.	.	.	.	.	.	.
MAY	12	.	.	.	.	.	.	.	.	.
	14 A3C	.	.	.	.	.	.	.	.	.
AUG	6	.	.	.	.	.	.	.	.	.
SEP	BDL	.	.	.	.	.	.	.	.	.
OCT	BDL	.	.	.	.	.	.	.	.	.
NOV	2	.	.	.	.	.	.	.	.	.
STANDRD PLATE CNT MF ( )			DET'N LIMIT = 0		GUIDELINE = 500/ML (A1)					
APR	.	37 T24	.	14 T24	.	.	.	.	.	23
MAY	.	2400 >	.	4 <=>	.	.	.	.	.	19
	.	24000 >	.	0 <=>	.	.	.	2400 >	.	.
JUL	.	40000 >	.	2400 >	.	.	.	24000 >	.	.
AUG	.	160	.	.	.	780	.	210	.	.
SEP	.	63	.	7 <=>	.	.	.	3800	.	.
OCT	.	2400 >	.	18	.	.	.	24000 >	.	.
NOV	.	24000 >	.	20 <=>	.	.	.	70 <=>	.	.
DEC	.	2 <=>	.	1 <=>	.	.	.	5 <=>	.	.
TOTAL COLIFORM MF (CT/100ML)			DET'N LIMIT = 0		GUIDELINE = 5/100ML(A1)					
APR	6000 T24	1 T24	.	2 T24	.	.	.	.	.	0
MAY	270 A3C	0	.	0	.	.	.	.	.	0
	15000 >	0 A3C	.	BDL	.	.	.	0 A3C	.	.
JUL	.	0 A3C	.	0	.	.	.	0 A3C	.	.

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM HAWKESBURY WTP 1989

	SITE TYPE	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM							
		RAW	TREATED	SITE 1		SITE 3		SITE 2		SITE 4	
				STANDING	FREE FLOW	STANDING	FREE FLOW	STANDING	FREE FLOW	STANDING	FREE FLOW
AUG		300 <=>	0	.	.	.	0	.	0	.	.
SEP		118 A3C	0	.	0	.	.	.	0	.	.
OCT		1600 A3C	0 A3C	.	0 A3C	.	.	.	BDL	.	.
NOV		600 <=>	0 A3C	.	0	.	.	.	0 A3C	.	.
DEC		.	0	.	0	.	.	.	0	.	.
T COLIFORM BCKGRD MF (CT/100ML)				DET'N LIMIT = 0		GUIDELINE = N/A					
APR		19000 T24	0 T24	.	0 T24	.	.	.	.	.	0
MAY		24000 >	0	.	0	.	.	.	.	.	.
		15000 >	2400 >	.	[illegible]	.	.	.	2400 >	.	.
JUL		.	2400 >	.	0	.	.	.	2400 >	.	.
AUG		45000 A3C	0	.	.	.	0	.	0	.	.
SEP		7545 A3C	0	.	0	.	.	.	10	.	.
OCT		38000 A3C	2400 >	.	310 A3C	.	.	.	24000 >	.	.
NOV		40000 >	2400 >	.	0	.	.	.	1060 A3C	.	.
DEC		.	0	.	0	.	.	.	0	.	.

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM HAWKESBURY WTP 1989

SITE TYPE	WATER TREATMENT PLANT RAW	WATER TREATMENT PLANT TREATED	DISTRIBUTION SYSTEM SITE 1 STANDING	DISTRIBUTION SYSTEM SITE 1 FREE FLOW	DISTRIBUTION SYSTEM SITE 3 STANDING	DISTRIBUTION SYSTEM SITE 3 FREE FLOW	DISTRIBUTION SYSTEM SITE 2 STANDING	DISTRIBUTION SYSTEM SITE 2 FREE FLOW	DISTRIBUTION SYSTEM SITE 4 STANDING	DISTRIBUTION SYSTEM SITE 4 FREE FLOW
CHEMISTRY (FLD)										
FLD CHLORINE (COMB) ( )			DET'N LIMIT = N/A		GUIDELINE = N/A					
APR	.	.350	.200	.	.	.	.	.	.200	.200
MAY	.	.200	.200	.100	.	.	.	.	.	.
	.	.150	.150	.150	.	.	.100	.100	.	.
JUL	.	.400	.150	.050	.	.	.200	.200	.	.
AUG	.	.050	.	.	.050	.050	.150	.150	.	.
SEP	.000	.150	.100	.200	.	.	.100	.100	.	.
OCT	.	.200	.050	.150	.	.	.100	.000	.	.
NOV	.	.500	.250	.100	.	.	.100	.100	.	.
DEC	.	.300	.250	.300	.	.	.200	.200	.	.
FLD CHLORINE FREE ( )			DET'N LIMIT = N/A		GUIDELINE = N/A					
APR	.	.050	.100	.400	.	.	.	.	.100	.100
MAY	.	.200	.	.150	.	.	.	.	.100	.100
	.	.300	.150	.200	.	.	.100	.100	.	.
JUL	.	.100	.100	.100	.	.	.100	.100	.	.
AUG	.	.500	.	.	.100	.100	.100	.100	.	.
SEP	.000	.500	.150	.200	.	.	.100	.100	.	.
OCT	.	.500	.200	.250	.	.	.100	.100	.	.
NOV	.	.400	.150	.350	.	.	.100	.100	.	.
DEC	.	.350	.100	.100	.	.	.100	.100	.	.
FLD CHLORINE (TOTAL) ( )			DET'N LIMIT = N/A		GUIDELINE = N/A					
APR	.	.400	.300	.400	.	.	.	.	.300	.300
MAY	.	.400	.200	.250	.	.	.	.	.100	.100

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM HAWKESBURY WTP 1989

SITE TYPE	WATER TREATMENT PLANT RAW	WATER TREATMENT PLANT TREATED	DISTRIBUTION SYSTEM SITE 1 STANDING	SITE 1 FREE FLOW	SITE 3 STANDING	SITE 3 FREE FLOW	SITE 2 STANDING	SITE 2 FREE FLOW	SITE 4 STANDING	SITE 4 FREE FLOW
MAY	.	.450	.300	.350	.	.	.200	.200	.	.
JUL	.	.500	.250	.150	.	.	.300	.300	.	.
AUG	.	.550	.	.	.150	.150	.500	.500	.	.
SEP	.000	.650	.250	.400	.	.	.	.	.	.
OCT	.	.700	.250	.400	.	.	.200	.100	.	.
NOV	.	.900	.400	.450	.	.	.200	.200	.	.
DEC	.	.650	.350	.400	.	.	.300	.300	.	.
FLD PH (DMNSLESS)			DET'N LIMIT = N/A		GUIDELINE = 6.5-8.5(A4)					
APR	7.000	7.000	7.200	.	.	.	.	.	7.400	7.400
MAY	7.000	7.700	7.300	7.300	.	.	.	.	7.300	7.500
	7.330	8.000	7.300	7.300	.	.	7.500	7.500	.	.
JUL	7.800	7.400	7.400	7.500	.	.	7.500	7.500	.	.
AUG	7.000	7.600	.	.	7.000	7.000	7.000	7.000	.	.
SEP	7.000	7.000	6.950	6.950	.	.	7.200	7.200	.	.
OCT	7.300	8.200	7.300	7.300	.	.	7.300	7.300	.	.
NOV	7.800	8.500	7.300	7.350	.	.	7.200	7.200	.	.
DEC	7.300	6.950	6.750	6.750	.	.	6.800	6.800	.	.
FLD TEMPERATURE ( )			DET'N LIMIT = N/A		GUIDELINE = 15 (A1)					
APR	.	.	6.000	2.000	.	.	.	.	5.000	5.000
MAY	7.500	7.400	9.000	7.500	.	.	.	.	8.000	6.100
	16.400	16.000	15.000	15.000	.	.	.	13.500	.	.
JUL	22.400	22.100	19.500	20.500	.	.	18.500	18.000	.	.
AUG	23.000	23.000	.	.	24.000	22.000	20.500	21.500	.	.
SEP	20.000	20.000	21.000	20.900	.	.	21.000	20.000	.	.

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM HAWKESBURY WTP 1989

SITE		WATER TREATMENT PLANT				DISTRIBUTION SYSTEM					
	RAW	TREATED	SITE 1		SITE 3		SITE 2		SITE 4		
TYPE			STANDING	FREE FLOW	STANDING	FREE FLOW	STANDING	FREE FLOW	STANDING	FREE FLOW	
OCT	15.000	15.000	17.500	15.500	.	.	17.000	16.500	.	.	
NOV	5.200	5.200	9.000	8.000	.	.	13.500	9.500	.	.	
DEC	1.000	.	4.500	5.000	.	.	5.500	3.000	.	.	
FLD TURBIDITY (FTU)			DET'N LIMIT = N/A		GUIDELINE = 1.0 (A1)						
									.670	.610	
APR	19.000	.820	1.200	.800	.	.	.	.	.	.	
MAY	2.900	.360	.	.	.	.	.	.	.	.	
	4.400	.660	.590	.560	.	.	.	.	.	.	
JUL	4.600	.230	.	.	.	.	.	.	.	.	
AUG	2.300	.250	.	.	.410	.410	.600	.280	.	.	
SEP	2.000	.220	.240	.180	.	.	.	.	.	.	
OCT	1.500	.210	.330	.210	.	.	.	.	.	.	
NOV	9.700	.360	1.000	1.000	.	.	.	.	.	.	
DEC	2.600	1.100	1.100	1.500	.	.	.910	.640	.	.	

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM HAWKESBURY WTP 1989

SITE TYPE	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM							
	RAW	TREATED	SITE 1		SITE 3		SITE 2		SITE 4	
			STANDING	FREE FLOW	STANDING	FREE FLOW	STANDING	FREE FLOW	STANDING	FREE FLOW
CHEMISTRY (LAB)										
ALKALINITY (MG/L)			DET'N LIMIT = .200		GUIDELINE = 30-500 (A4)					
APR	32.900	36.200	35.900	35.600	.	.	.	.	35.800	35.800
MAY	23.500	27.700	25.000	25.800	.	.	.	.	25.000	27.000
	24.100	28.800	27.600	27.300	.	.	27.200	27.300	.	.
JUL	25.000	24.200	27.300	26.600	.	.	26.400	26.600	.	.
AUG	22.400	26.100	.	.	21.100	21.000	23.000	20.700	.	.
SEP	21.900	20.900	21.300	20.600	.	.	22.800	IIS	.	.
OCT	21.200	26.900	25.300	25.200	.	.	25.200	25.300	.	.
NOV	31.100	37.400	30.900	30.900	.	.	31.100	30.600	.	.
DEC	28.800	19.900	10.200	6.400	.	.	15.000	14.400	.	.
CALCIUM (MG/L)			DET'N LIMIT = .100		GUIDELINE = 100 (F2)					
APR	11.800	20.200	20.200	20.000	.	.	.	.	19.800	20.000
MAY	9.000	17.000	16.200	16.400	.	.	.	.	16.200	16.600
	9.200	16.800	17.000	16.400	.	.	16.200	16.200	.	.
JUL	9.400	16.200	17.400	17.400	.	.	17.400	17.600	.	.
AUG	8.200	15.600	.	.	14.800	14.400	15.800	15.600	.	.
SEP	8.000	14.200	14.200	13.600	.	.	14.600	14.800	.	.
OCT	8.600	17.600	16.600	16.400	.	.	16.600	16.200	.	.
NOV	12.400	20.000	19.600	19.600	.	.	19.800	19.600	.	.
DEC	14.000	17.700	15.000	15.200	.	.	15.900	15.600	.	.
CYANIDE (MG/L)			DET'N LIMIT = 0.001		GUIDELINE = .200 (A1)					
APR	BDL	BDL	.	BDL	.	.	.	.	.	BDL
MAY	BDL	BDL	.	BDL	.	.	.	.	.	BDL

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM HAWKESBURY WTP 1989

SITE TYPE	WATER TREATMENT PLANT RAW	WATER TREATMENT PLANT TREATED	DISTRIBUTION SYSTEM SITE 1 STANDING	SITE 1 FREE FLOW	SITE 3 STANDING	SITE 3 FREE FLOW	SITE 2 STANDING	SITE 2 FREE FLOW	SITE 4 STANDING	SITE 4 FREE FLOW
MAY	BDL	BDL	.	BDL	.	.	.	BDL	.	.
JUL	BDL	BDL	.	BDL	.	.	.	BDL	.	.
AUG	BDL	BDL	.	.	.	BDL	.	BDL	.	.
SEP	BDL	BDL	.	BDL	.	.	.	BDL	.	.
OCT	BDL	BDL	.	BDL	.	.	.	BDL	.	.
NOV	BDL	.002 <T	.	BDL	.	.	.	BDL	.	.
DEC	BDL	BDL	.	BDL	.	.	.			
CHLORIDE (MG/L)			DET'N LIMIT = .200		GUIDELINE = 250 (A3)					
APR	6.600	6.900	6.900	6.900	.	.	.	.	6.900	6.800
MAY	2.600	4.000	4.000	3.700	.	.	.	.	3.900	3.700
	3.100	4.900	4.700	5.000	.	.	4.700	4.700	.	.
JUL	2.800	4.500	4.500	4.400	.	.	4.500	4.500	.	
AUG	3.100	5.500	.	.	5.600	5.600	5.400	5.500	.	.
SEP	3.200	5.300	5.200	5.300	.	.	5.200	IIS	.	.
OCT	3.200	5.100	5.200	5.100	.	.	5.000	5.000	.	.
NOV	5.700	7.100	7.100	7.100	.	.	7.100	7.200	.	.
DEC	3.800	5.300	5.200	5.100	.	.	5.000	5.000	.	.
COLOUR (HZU)			DET'N LIMIT = .5		GUIDELINE = 5.0 (A3)					
APR	38.500	6.500	7.000	6.500	.	.	.	.	6.500	6.500
MAY	35.000	4.500	5.000	5.000	.	.	.	.	5.000	4.500
	40.000	7.000	6.000	5.500	.	.	6.500	6.000	.	.
JUL	35.500	4.500	7.000	6.500	.	.	5.500	6.000	.	.
AUG	30.000	4.000	.	.	4.000	3.500	3.500	3.000	.	.
SEP	26.000	3.500	3.500	3.500	.	.	3.500	IIS	.	.

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM HAWKESBURY WTP 1989

SITE TYPE	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM							
	RAW	TREATED	SITE 1		SITE 3		SITE 2		SITE 4	
			STANDING	FREE FLOW	STANDING	FREE FLOW	STANDING	FREE FLOW	STANDING	FREE FLOW
OCT	26.000	3.000	3.000	3.500	.	.	3.500	3.500	.	.
NOV	35.000	10.000	4.500	5.000	.	.	5.500	4.500	.	.
DEC	38.000	5.500	4.000	3.000	.	.	5.000	5.000	.	.
CONDUCTIVITY (UMHO/CM)			DET'N LIMIT = 1		GUIDELINE = 400 (F2)					
APR	115	168	167	166	.	.	.	.	167	167
MAY	83	137	134	132	.	.	.	.	134	134
	82	133	131	132	.	.	130	130	.	.
JUL	74	118	122	121	.	.	122	122	.	.
AUG	78	124	.	.	125	125	132	131	.	.
SEP	77	114	118	117	.	.	120	115	.	.
OCT	77	130	128	128	.	.	126	126	.	.
NOV	109	158	156	156	.	.	157	156	.	.
DEC	95	129	118	119	.	.	119	118	.	.
FLUORIDE (MG/L)			DET'N LIMIT = .01		GUIDELINE = 2.400 (A1)					
APR	.060	1.020	1.000	1.000	.	.	.	.	1.000	1.000
MAY	.060	1.060	1.160	1.140	.	.	.	.	1.180	1.220
	.060	1.020	1.180	1.220	.	.	1.100	1.120	.	.
JUL	.060	.240	.380	.300	.	.	.400	.360	.	.
AUG	.020 <T	.860	.	.	.840	.840	.820	.700	.	.
SEP	.060	.920	1.040	1.060	.	.	.980	115	.	.
OCT	.040 <T	.880	.940	1.020	.	.	.760	.860	.	.
NOV	.060	1.180	.300	.320	.	.	.700	.500	.	.
DEC	.040 <T	.800	.600	.660	.	.	.540	.560	.	.

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM HAWKESBURY WTP 1989

SITE TYPE	RAW	TREATED	WATER TREATMENT PLANT SITE 1 STANDING	SITE 1 FREE FLOW	DISTRIBUTION SYSTEM SITE 3 STANDING	SITE 3 FREE FLOW	SITE 2 STANDING	SITE 2 FREE FLOW	SITE 4 STANDING	SITE 4 FREE FLOW
HARDNESS (MG/L)			DET'N LIMIT = .500		GUIDELINE = 80-100 (A4)					
APR	41.000	62.000	62.000	61.000	.	.	.	.	61.000	61.000
MAY	33.000	53.000	51.000	51.000	.	.	.	.	51.000	52.000
	32.000	51.000	51.000	49.000	.	.	50.000	49.000	.	.
JUL	32.000	49.000	53.000	52.000	.	.	52.000	53.000	.	.
AUG	28.000	47.000	.	.	46.000	45.000	48.000	48.000	.	.
SEP	28.000	44.000	44.000	42.000	.	.	45.000	45.000	.	.
OCT	29.000	52.000	49.000	49.000	.	.	51.000	48.000	.	.
NOV	43.000	62.000	61.000	62.000	.	.	62.000	61.000	.	.
DEC	45.900	54.700	47.600	48.500	.	.	49.600	48.900	.	.
IONCAL (DIMNSLESS)			DET'N LIMIT = N/A		GUIDELINE = N/A					
APR	2.802	5.303	6.132	5.366	.	.	.	.	4.129	6.736
MAY	9.438	7.687	9.442	9.280	.	.	.	.	8.788	7.680
	1.970	1.793	5.077	.223	.	.	.972	.768	.	.
JUL	1.560	7.805	7.649	9.158	.	.	8.714	9.242	.	.
AUG	2.542	.079	.	.	.094	.860	.757	.641	.	.
SEP	.735	4.203	2.441	.643	.	.	.988	.000 NAF	.	.
OCT	6.933	9.120	6.685	6.939	.	.	9.266	4.178	.	.
NOV	6.000	5.059	1.050	5.671	.	.	6.325	3.632	.	.
DEC	2.102	5.010	3.689	4.454	.	.	2.868	.470	.	.
LANGELIERS INDEX (DIMNSLESS)			DET'N LIMIT = N/A		GUIDELINE = N/A					
APR	-1.035	-.683	-.677	-.674	.	.	.	.	-.707	-.692
MAY	-1.274	-.851	-.955	-.975	.	.	.	.	-.955	-.911
	-1.553	-1.028	-1.080	-1.111	.	.	-1.107	-1.055	.	.

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM HAWKESBURY WTP 1989

	WATER TREATMENT PLANT						DISTRIBUTION SYSTEM			
SITE	RAW	TREATED	SITE 1		SITE 3		SITE 2		SITE 4	
TYPE			STANDING	FREE FLOW	STANDING	FREE FLOW	STANDING	FREE FLOW	STANDING	FREE FLOW
JUL	-1.615	-1.262	-1.151	-1.172	.	.	-1.205	-1.167	.	.
AUG	-1.443	-1.049	.	.	-1.284	-1.248	-1.152	-1.252	.	.
SEP	-1.523	-1.341	-1.365	-1.428	.	.	-1.294	.	.	.
OCT	-1.546	-.896	-1.027	-1.014	.	.	-1.028	-.987	.	.
NOV	-1.085	-.640	-.801	-.821	.	.	-.844	-.835	.	.
DEC	-1.120	-1.234	-2.181	-2.718	.	.	-1.679	-1.674	.	.
MAGNESIUM (MG/L)			DET'N LIMIT = .050		GUIDELINE = 30 (F2)					
APR	2.800	2.700	2.800	2.700	.	.	.	.	2.800	2.800
MAY	2.600	2.600	2.500	2.500	.	.	.	.	2.500	2.600
	2.200	2.200	2.200	2.000	.	.	2.100	2.100	.	.
JUL	2.000	2.100	2.200	2.200	.	.	2.100	2.100	.	.
AUG	1.900	1.900	.	.	2.100	2.200	2.200	2.200	.	.
SEP	2.100	2.100	2.100	2.000	.	.	2.100	2.000	.	.
OCT	1.900	1.900	1.900	2.000	.	.	2.200	1.900	.	.
NOV	3.000	2.900	2.900	3.000	.	.	3.000	3.000	.	.
DEC	2.650	2.600	2.500	2.550	.	.	2.400	2.400	.	.
SODIUM (MG/L)			DET'N LIMIT = .200		GUIDELINE = 200 (C3)					
APR	5.200	6.200	6.200	6.200	.	.	.	.	6.000	6.600
MAY	2.800	3.800	4.000	3.800	.	.	.	.	3.800	3.800
	2.800	3.800	3.800	3.600	.	.	3.600	3.600	.	.
JUL	2.800	3.400	3.400	3.400	.	.	3.600	3.400	.	.
AUG	2.800	3.600	.	.	4.000	4.000	3.800	3.800	.	.
SEP	3.200	4.000	4.200	4.000	.	.	4.000	4.000	.	.
OCT	3.400	4.400	4.400	4.400	.	.	4.200	4.000	.	.

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM HAWKESBURY WTP 1989

SITE TYPE	WATER TREATMENT PLANT RAW	WATER TREATMENT PLANT TREATED	DISTRIBUTION SYSTEM SITE 1 STANDING	DISTRIBUTION SYSTEM SITE 1 FREE FLOW	DISTRIBUTION SYSTEM SITE 3 STANDING	DISTRIBUTION SYSTEM SITE 3 FREE FLOW	DISTRIBUTION SYSTEM SITE 2 STANDING	DISTRIBUTION SYSTEM SITE 2 FREE FLOW	DISTRIBUTION SYSTEM SITE 4 STANDING	DISTRIBUTION SYSTEM SITE 4 FREE FLOW
NOV	4.800	6.000	5.200	5.600	.	.	5.600	5.200	.	.
DEC	.500	1.900	1.700	1.400	.	.	1.700	1.400	.	.
AMMONIUM TOTAL (MG/L)			DET'N LIMIT = 0.002		GUIDELINE = .05 (F2)					
APR	.180	.146	.128	.130	.	.	.	.	.126	.142
MAY	.008 <T	.002 <T	.010	.002 <T	.	.	.	.	.002 <T	.002 <
	.006 <T	.002 <T	BDL	.002 <T	.	.	.006 <T	.002 <T	.	.
JUL	.006 <T	.002 <T	.012	.006 <T	.	.	.004 <T	.008 <T	.	.
AUG	BDL	BDL	.	.	.002 <T	.002 <T	BDL	.002 <T	.	.
SEP	.004 <T	BDL	BDL	.012	.	.	BDL	IIS	.	.
OCT	.004 <T	BDL	.006 <T	.002 <T	.	.	.002 <T	.006 <T	.	.
NOV	.016	.008 <T	.006 <T	.008 <T	.	.	BDL	BDL	.	.
DEC	.026	.006 <T	.030	.016	.	.	.020	.024	.	.
NITRITE (MG/L)			DET'N LIMIT = 0.001		GUIDELINE = 1.000 (A1)					
APR	.046	.003 <T	.006	.004 <T	.	.	.	.	.004 <T	.003 <
MAY	.044	.005	.005	.005	.	.	.	.	.006	.004 <
	.005	.002 <T	.002 <T	.002 <T	.	.	.002 <T	.002 <T	.	.
JUL	.015	BDL	.001 <T	BDL	.	.	.001 <T	.001 <T	.	.
AUG	.004 <T	BDL	.	.	BDL	BDL	BDL	BDL	.	.
SEP	.007	.004 <T	.004 <T	.006	.	.	.004 <T	IIS	.	.
OCT	.019	.001 <T	.002 <T	.001 <T	.	.	.003 <T	.002 <T	.	.
NOV	.012	.003 <T	.001 <T	.001 <T	.	.	.004 <T	.001 <T	.	.
DEC	.010	.002 <T	.003 <T	.002 <T	.	.	.003 <T	.002 <T	.	.
TOTAL NITRATES (MG/L)			DET'N LIMIT = .020		GUIDELINE = 10.000 (A1)					

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM HAWKESBURY WTP 1989

SITE			WATER TREATMENT PLANT		DISTRIBUTION SYSTEM					
	RAW	TREATED	SITE 1		SITE 3		SITE 2		SITE 4	
TYPE			STANDING	FREE FLOW	STANDING	FREE FLOW	STANDING	FREE FLOW	STANDING	FREE FLOW
APR	.455	.435	.430	.425	.	.	.	.	.430	.425
MAY	.285	.230	.230	.230	.	.	.	.	.230	.240
	.200	.170	.175	.170	.	.	.175	.180	.	.
JUL	.210	.170	.175	.175	.	.	.180	.180	.	.
AUG	.170	.165	.	.	.175	.170	.170	.160	.	.
SEP	.205	.175	.180	.180	.	.	.175	[illegible]S	.	.
OCT	.200	.165	.165	.160	.	.	.155	.165	.	.
NOV	.260	.255	.270	.265	.	.	.275	.275	.	.
DEC	.275	.200	.210	.205	.	.	.215	.220	.	.
NITROGEN TOT KJELD (MG/L)			DET'N LIMIT = .020		GUIDELINE = N/A					
APR	.730	.390	[illegible]	.370	.	.	.	.	.400	.390
MAY	.390	.170	.190	.170		.	.	.	.180	.170
	[illegible]	[illegible]	.230	.170	.	.	[illegible]	[illegible]	.	.
JUL	.350	.160	.240	.220	.	.	.190	.190	.	.
AUG	.360	.200	.	.	.170	.160	.180	.150	.	.
SEP	.330	.180	.170	.230	.	.	.180	.170	.	.
OCT	.320	.170	.200	.180	.	.	.200	.180	.	.
NOV	.400	.270	.220	.210	.	.	.200	.200	.	.
DEC	.400	.210	.290	.220	.	.	.200	.220	.	.
PH (DIMNSLESS)			DET'N LIMIT = N/A		GUIDELINE = 6.5-8.5(A4)					
APR	7.740	7.840	7.850	7.860	.	.	.	.	7.830	7.840
MAY	7.750	7.850	7.810	7.770	.	.	.	.	7.810	7.810
	7.450	7.660	7.620	7.610	.	.	7.620	7.470	.	.
JUL	7.360	7.510	7.540	7.530	.	.	7.500	7.[illegible]	.	.

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM HAWKESBURY WTP 1989

SITE TYPE	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM							
	RAW	TREATED	SITE 1		SITE 3		SITE 2		SITE 4	
			STANDING	FREE FLOW	STANDING	FREE FLOW	STANDING	FREE FLOW	STANDING	FREE FLOW
AUG	7.640	7.710	.	.	7.590	7.640	7.660	7.610	.	.
SEP	7.580	7.550	7.520	7.490	.	.	7.550	115	.	.
OCT	7.540	7.800	7.720	7.740	.	.	7.720	7.770	.	.
NOV	7.690	7.870	7.800	7.780	.	.	7.750	7.770	.	.
DEC	7.630	7.590	7.000	6.660	.	.	7.310	7.340	.	.
PHOSPHORUS FIL REACT (MG/L)			DET'N LIMIT = .0005		GUIDELINE = N/A					
APR	.040	.006	.	.	.	.	.	.	.	.
MAY	.001 <T	BDL	.	.	.	.	.	.	.	.
	.002	.001 <T	.	.	.	.	.	.	.	.
JUL	.001 <T	.001 <T	.	.	.	.	.	.	.	.
AUG	.001 <T	.003	.	.	.	.	.	.	.	.
SEP	.003	.000 <T	.	.	.	.	.	.	.	.
OCT	.001 <T	.001 <T	.	.	.	.	.	.	.	.
NOV	.007	.004	.	.	.	.	.	.	.	.
DEC	.001 <T	.003	.	.	.	.	.	.	.	.
PHOSPHORUS TOTAL (MG/L)			DET'N LIMIT = .002		GUIDELINE = .40 (F2)					
APR	.083	.013	.	.	.	.	.	.	.	.
MAY	.018	.007 <T	.	.	.	.	.	.	.	.
	.031	.013	.	.	.	.	.	.	.	.
JUL	.021	.007 <T	.	.	.	.	.	.	.	.
AUG	.022	.008 <T	.	.	.	.	.	.	.	.
SEP	.020	.008 <T	.	.	.	.	.	.	.	.
OCT	.014	.006 <T	.	.	.	.	.	.	.	.
NOV	.028	.012	.	.	.	.	.	.	.	.

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM HAWKESBURY WTP 1989

SITE TYPE	RAW	TREATED	WATER TREATMENT PLANT SITE 1 STANDING	WATER TREATMENT PLANT SITE 1 FREE FLOW	DISTRIBUTION SYSTEM SITE 3 STANDING	DISTRIBUTION SYSTEM SITE 3 FREE FLOW	DISTRIBUTION SYSTEM SITE 2 STANDING	DISTRIBUTION SYSTEM SITE 2 FREE FLOW	DISTRIBUTION SYSTEM SITE 4 STANDING	DISTRIBUTION SYSTEM SITE 4 FREE FLOW
DEC	.014	.005 <T	.	.	.	.	.	.	.	.
SULPHATE (MG/L)			DET'N LIMIT = .200		GUIDELINE = 500. (A3)					
APR	7.340	23.270	23.350	23.330	.	.	.	.	23.440	23.590
MAY	7.390	21.930	21.940	21.690	.	.	.	.	21.980	22.090
	7.880	21.020	21.130	21.040	.	.	21.050	21.030	.	.
JUL	7.230	20.390	20.540	20.590	.	.	20.860	20.480	.	.
AUG	7.550	19.370	.	.	23.630	23.670	24.920	26.490	.	.
SEP	8.350	20.790	21.770	21.630	.	.	21.600	21.880	.	.
OCT	7.570	20.640	21.050	21.080	.	.	20.890	20.870	.	.
NOV	10.250	22.070	28.370	26.560	.	.	26.350	27.160	.	.
DEC	10.480	27.000	30.170	33.630	.	.	27.870	28.290	.	.
TURBIDITY (FTU)			DET'N LIMIT = .02		GUIDELINE = 1.00 (A1)					
APR	30.000	1.310 RRV	3.000 RRV	1.850 RRV	.	.	.	.	2.800 RRV	1.900 R
MAY	3.400	.460	.750	.690	.	.	.	.	.920	.530
	7.500	1.500 RRV	1.890 RRV	.950	.	.	1.060 RRV	.560	.	.
JUL	4.700	.370	.800	.790	.	.	.760	.850	.	.
AUG	2.900	.600	.	.	.570	.660	.650	.510	.	.
SEP	2.600	.540	.550	.400	.	.	.650	IIS	.	.
OCT	2.200	.470	.950	.700	.	.	.520	.570	.	.
NOV	11.800	12.000 RRV	3.700	2.000	.	.	1.310	.720	.	.
DEC	2.800	1.320 RRV	2.200 RRV	4.300 RRV	.	.	1.360 RRV	2.100 RRV	.	.

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM HAWKESBURY WTP 1989

		WATER TREATMENT PLANT				DISTRIBUTION SYSTEM					
	RAW	TREATED	SITE 1		SITE 3		SITE 2		SITE 4	
			STANDING	FREE FLOW	STANDING	FREE FLOW	STANDING	FREE FLOW	STANDING	FREE FLOW
METALS										
SILVER (UG/L)			DET'N LIMIT = .020		GUIDELINE = 50. (A1)					
APR	.100 <T	.060 <T	.060 <T	.100 <T	.	.	.	.	.070 <T	.060
MAY	BDL	.040 <T	BDL	BDL	.	.	.	.	BDL	BDL
	.110 <T	.030 <T	.060 <T	.050 <T	.	.	.060 <T	BDL	.	.
JUL	BDL	BDL	BDL	BDL	.	.	BDL	.080 <T	.	.
AUG	BDL	BDL	.	.	.040 <T	BDL	BDL	BDL	.	.
SEP	BDL	BDL	BDL	BDL	.	.	.030 <T	BDL	.	.
OCT	BDL	BDL	BDL	BDL	.	.	BDL	BDL	.	.
NOV	BDL	BDL	BDL	BDL	.	.	BDL	BDL	.	.
DEC	BDL	BDL	BDL	BDL	.	.	BDL	BDL	.	.
ALUMINUM (UG/L)			DET'N LIMIT = .050		GUIDELINE = 100.(A4)					
APR	464.000	139.200	266.800	150.800	.	.	.	.	150.800	139.200
MAY	162.400	174.000	220.400	208.800	.	.	.	.	208.800	93.960
	200.000	330.000	260.000	240.000	.	.	280.000	190.000	.	.
JUL	240.000	150.000	380.000	350.000	.	.	250.000	300.000	.	.
AUG	120.000	160.000	.	.	310.000	340.000	390.000	210.000	.	.
SEP	110.000	120.000	130.000	100.000	.	.	100.000	67.000	.	.
OCT	88.000	120.000	140.000	140.000	.	.	150.000	130.000	.	.
NOV	24.000	410.000	260.000	270.000	.	.	170.000	96.000	.	.
DEC	120.000	360.000	580.000	1000.000	.	.	260.000	250.000	.	.
ARSENIC (UG/L)			DET'N LIMIT = 0.050		GUIDELINE = 50.0 (A1)					
APR	.730 <T	.320 <T	.220 <T	.430 <T	.	.	.	.	.350 <T	.160
MAY	.890 <T	.560 <T	.540 <T	.370 <T	.	.	.	.	.500 <T	.290

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM HAWKESBURY WTP 1989

SITE TYPE	RAW	TREATED	WATER TREATMENT PLANT SITE 1 STANDING	SITE 1 FREE FLOW	SITE 3 STANDING	SITE 3 FREE FLOW	DISTRIBUTION SYSTEM SITE 2 STANDING	SITE 2 FREE FLOW	SITE 4 STANDING	SITE 4 FREE FLOW
MAY	1.000 <T	.550 <T	.560 <T	.500 <T	.	.	.620 <T	.550 <T	.	.
JUL	1.100	.600 <T	.760 <T	.650 <T	.	.	.550 <T	.450 <T	.	.
AUG	.990 <T	.520 <T	.	.	.560 <T	.280 <T	.530 <T	.420 <T	.	.
SEP	1.500	.630 <T	.610 <T	.490 <T	.	.	.770 <T	.520 <T	.	.
OCT	.650 <T	.240 <T	.180 <T	.150 <T	.	.	.170 <T	.220 <T	.	.
NOV	.340 <T	.340 <T	.280 <T	.340 <T	.	.	.190 <T	.150 <T	.	.
DEC	.560 <T	.200 <T	.210 <T	.130 <T	.	.	BDL	.110 <T	.	.
BARIUM (UG/L)			DET'N LIMIT = 0.020		GUIDELINE = 1000. (A1)					
APR	24.000	18.000	18.000	17.000	.	.	.	.	19.000	18.000
MAY	17.000	15.000	14.000	14.000	.	.	.	.	14.000	13.000
	20.000	17.000	16.000	16.000	.	.	15.000	15.000	.	.
JUL	19.000	17.000	17.000	16.000	.	.	16.000	15.000	.	.
AUG	18.000	16.000	.	.	18.000	18.000	19.000	22.000	.	.
SEP	19.000	17.000	17.000	17.000	.	.	18.000	16.000	.	.
OCT	18.000	17.000	16.000	14.000	.	.	14.000	13.000	.	.
NOV	14.000	17.000	16.000	16.000	.	.	15.000	15.000	.	.
DEC	18.000	15.000	18.000	19.000	.	.	17.000	17.000	.	.
BORON (UG/L)			DET'N LIMIT = 0.200		GUIDELINE = 5000. (A1)					
APR	21.000	10.000 <T	15.000 <T	8.300 <T	.	.	.	.	7.900 <T	14.000 <
MAY	60.000	8.300 <T	42.000	42.000	.	.	.	.	6.500 <T	33.000
	9.600 <T	5.400 <T	9.500 <T	8.900 <T	.	.	5.200 <T	8.000 <T	.	.
JUL	8.400 <T	7.600 <T	9.800 <T	8.100 <T	.	.	4.100 <T	6.800 <T	.	.
AUG	11.000 <T	13.000 <T	.	.	7.000 <T	6.200 <T	5.700 <T	8.000 <T	.	.
SEP	15.000 <T	11.000 <T	11.000 <T	11.000 <T	.	.	5.600 <T	9.700 <T	.	.

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM HAWKESBURY WTP 1989

SITE			WATER TREATMENT PLANT				DISTRIBUTION SYSTEM			
			SITE 1		SITE 3		SITE 2		SITE 4	
TYPE	RAW	TREATED	STANDING	FREE FLOW	STANDING	FREE FLOW	STANDING	FREE FLOW	STANDING	FREE FLOW
OCT	8.000 <T	6.100 <T	9.300 <T	5.900 <T	-	-	5.800 <T	6.300 <T	-	-
NOV	9.100 <T	9.200 <T	9.900 <T	8.500 <T	-	-	6.900 <T	6.300 <T	-	-
DEC	6.100 <T	6.100 <T	8.800 <T	6.300 <T	-	-	6.700 <T	6.000 <T	-	-
BERYLLIUM (UG/L)			DET'N LIMIT = 0.010		GUIDELINE = N/A					
APR	BDL	BDL	.020 <T	.020 <T	-	-	-	-	BDL	.060 <
MAY	.080 <T	BDL	BDL	BDL	-	-	-	-	BDL	BDL
	.040 <T	BDL	.070 <T	BDL	-	-	.020 <T	.060 <T	-	-
JUL	BDL	.050 <T	BDL	BDL	-	-	BDL	.020 <T	-	-
AUG	.030 <T	.030 <T	-	-	BDL	BDL	.050 <T	BDL	-	-
SEP	BDL	BDL	BDL	BDL	-	-	BDL	BDL	-	-
OCT	.050 <T	BDL	BDL	BDL	-	-	.020 <T	BDL	-	-
NOV	BDL	BDL	BDL	BDL	-	-	BDL	BDL	-	-
DEC	BDL	BDL	BDL	BDL	-	-	BDL	BDL	-	-
CADMIUM (UG/L)			DET'N LIMIT = 0.050		GUIDELINE = 5.000 (A1)					
APR	.160 <T	.170 <T	.230 <T	.100 <T	-	-	-	-	.180 <T	.080 <
MAY	.170 <T	.060 <T	.120 <T	BDL	-	-	-	-	.100 <T	BDL
	BDL	BDL	BDL	BDL	-	-	BDL	BDL	-	-
JUL	BDL	BDL	BDL	BDL	-	-	BDL	BDL	-	-
AUG	BDL	BDL	-	-	BDL	BDL	BDL	BDL	-	-
SEP	BDL	BDL	BDL	BDL	-	-	.340 <T	BDL	-	-
OCT	BDL	BDL	.080 <T	BDL	-	-	BDL	BDL	-	-
NOV	BDL	BDL	BDL	BDL	-	-	BDL	BDL	-	-
DEC	BDL	BDL	BDL	BDL	-	-	BDL	BDL	-	-

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM HAWKESBURY WTP 1989

SITE TYPE	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM							
	RAW	TREATED	SITE 1		SITE 3		SITE 2		SITE 4	
			STANDING	FREE FLOW	STANDING	FREE FLOW	STANDING	FREE FLOW	STANDING	FREE FLOW
COBALT (UG/L)			DET'N LIMIT = 0.020		GUIDELINE = N/A					
APR	.570 <T	.190 <T	.220 <T	.230 <T	.	.	.	.	.150 <T	.130 <T
MAY	.290 <T	.160 <T	.150 <T	.160 <T	.	.	.	.	.160 <T	.140 <T
	.350 <T	.200 <T	.180 <T	.220 <T	.	.	.250 <T	.150 <T	.	.
JUL	.200 <T	BDL	.040 <T	BDL	.	.	.040 <T	.060 <T	.	.
AUG	.200 <T	.140 <T	.	.	.160 <T	.160 <T	.200 <T	.190 <T	.	.
SEP	.210 <T	.180 <T	.180 <T	.140 <T	.	.	.190 <T	.160 <T	.	.
OCT	.110 <T	.090 <T	.110 <T	.110 <T	.	.	.070 <T	.110 <T	.	.
NOV	.040 <T	.150 <T	.090 <T	.090 <T	.	.	.140 <T	.140 <T	.	.
DEC	.190 <T	.110 <T	.130 <T	.150 <T	.	.	.120 <T	.140 <T	.	.
CHROMIUM (UG/L)			DET'N LIMIT = 0.100		GUIDELINE = 50. (A1)					
APR	1.500	BDL	.160 <T	BDL	.	.	.	.	BDL	BDL
MAY	2.500	.260 <T	1.600	1.600	.	.	.	.	.110 <T	1.100
	1.500	BDL	1.100	1.000 <T	.	.	BDL	.600 <T	.	.
JUL	1.600	.950 <T	1.400	1.200	.	.	.220 <T	.850 <T	.	.
AUG	1.200	1.300	.	.	.370 <T	.180 <T	.120 <T	.380 <T	.	.
SEP	1.500	.960 <T	.840 <T	.920 <T	.	.	BDL	.940 <T	.	.
OCT	1.200	BDL	.270 <T	BDL	.	.	BDL	.360 <T	.	.
NOV	BDL	.200 <T	.250 <T	BDL	.	.	BDL	BDL	.	.
DEC	BDL	BDL	BDL	.530 <T	.	.	BDL	BDL	.	.
COPPER (UG/L)			DET'N LIMIT = .100		GUIDELINE = 1000 (A3)					
APR	3.300	1.300	36.000	8.900	.	.	.	.	23.000	7.600
MAY	2.500	.850 <T	24.000	4.600	.	.	.	.	100.000	8.500
	3.900	2.300	18.000	4.300	.	.	89.000	8.200	.	.

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM HAWKESBURY WTP 1989

SITE		WATER TREATMENT PLANT				DISTRIBUTION SYSTEM					
	RAW	TREATED	SITE 1		SITE 3		SITE 2		SITE 4	
TYPE			STANDING	FREE FLOW	STANDING	FREE FLOW	STANDING	FREE FLOW	STANDING	FREE FLOW
JUL	2.000	1.100	19.000	4.700	.	.	57.000	44.000	.	.
AUG	2.700	1.200	.	.	21.000	20.000	69.000	26.000	.	.
SEP	2.400	1.300	38.000	13.000	.	.	81.000	28.000	.	.
OCT	1.600	.700 <T	27.000	5.700	.	.	50.000	8.600	.	.
NOV	2.800	1.500	7.900	7.100	.	.	100.000	13.000	.	.
DEC	1.500 <T	.940 <T	110.000	27.000	.	.	100.000	45.000	.	.
IRON (UG/L)			DET'N LIMIT = 4.000		GUIDELINE = 300. (A3)					
APR	640.000	92.000	180.000	110.000	.	.	.	.	90.000	83.000
MAY	230.000	42.000 <T	53.000	45.000 <T	.	.	.	.	77.000	11.000 <
	360.000	33.000 <T	43.000 <T	12.000 <T	.	.	89.000	14.000 <T	.	.
JUL	310.000	25.000 <T	100.000	49.000 <T	.	.	54.000	49.000 <T	.	.
AUG	210.000	33.000 <T	.	.	43.000 <T	49.000 <T	71.000	38.000 <T	.	.
SEP	180.000	27.000 <T	35.000 <T	18.000 <T	.	.	45.000 <T	16.000 <T	.	.
OCT	190.000	34.000 <T	43.000 <T	16.000 <T	.	.	31.000 <T	24.000 <T	.	.
NOV	15.000 <T	200.000	72.000	74.000	.	.	110.000	23.000 <T	.	.
DEC	210.000	45.000 <T	44.000 <T	55.000 <T	.	.	67.000	60.000 <T	.	.
MERCURY (UG/L)			DET'N LIMIT = 0.010		GUIDELINE = 1.000 (A1)					
APR	BDL	BDL	.	BDL	.	.	.	.	.	BDL
MAY	BDL	BDL	.	BDL	.	.	.	.	.	BDL
	BDL	BDL	.	BDL	.	.	.	BDL	.	.
JUL	BDL	BDL	.	BDL	.	.	.	.020 <T	.	.
AUG	BDL	BDL	.	.	.	BDL	.	BDL	.	.
SEP	BDL	.040 <T	.	.060	.	.	.	BDL	.	.
OCT	.030 <T	.030 <T	.	BDL	.	.	.	.040 <T	.	.

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM HAWKESBURY WTP 1989

SITE	RAW	TREATED	WATER TREATMENT PLANT SITE 1		DISTRIBUTION SYSTEM SITE 3		SITE 2		SITE 4	
TYPE			STANDING	FREE FLOW	STANDING	FREE FLOW	STANDING	FREE FLOW	STANDING	FREE FLOW
NOV	BDL	BDL	.	.020 <T	.	.	.	BDL	.	.
DEC	.050 <T	.050 <T	.	.030 <T	.	.	.	BDL	.	.
MANGANESE (UG/L)			DET'N LIMIT = .050		GUIDELINE = 50.0 (A3)					
APR	43.000	36.000	39.000	35.000	.	.	.	.	35.000	34.000
MAY	17.000	17.000	13.000	12.000	.	.	.	.	13.000	8.400
	53.000	16.000	16.000	12.000	.	.	12.000	7.500	.	.
JUL	25.000	16.000	24.000	12.000	.	.	11.000	9.800	.	.
AUG	20.000	12.000	.	.	11.000	11.000	13.000	12.000	.	.
SEP	33.000	9.500	7.800	6.600	.	.	8.500	6.400	.	.
OCT	16.000	14.000	14.000	9.100	.	.	8.400	7.600	.	.
NOV	.320 <T	11.000	17.000	16.000	.	.	8.000	4.600	.	.
DEC	16.000	12.000	12.000	12.000	.	.	12.000	12.000	.	.
MOLYBDENUM (UG/L)			DET'N LIMIT = 0.020		GUIDELINE = N/A					
APR	.170 <T	.320 <T	.380 <T	.300 <T	.	.	.	.	.380 <T	.410 <T
MAY	.210 <T	.410 <T	.330 <T	.450 <T	.	.	.	.	.220 <T	.410 <T
	.280 <T	.410 <T	.490 <T	.440 <T	.	.	.320 <T	.560	.	.
JUL	.260 <T	.170 <T	.210 <T	.250 <T	.	.	.180 <T	.390 <T	.	.
AUG	.350 <T	.320 <T	.	.	.250 <T	.260 <T	.220 <T	.180 <T	.	.
SEP	.470 <T	.550	.500 <T	.510	.	.	.410 <T	.440 <T	.	.
OCT	.220 <T	.250 <T	.170 <T	.220 <T	.	.	.220 <T	.190 <T	.	.
NOV	.470 <T	.190 <T	.210 <T	.170 <T	.	.	.160 <T	.230 <T	.	.
DEC	.200 <T	.230 <T	.150 <T	.220 <T	.	.	.170 <T	.190 <T	.	.
NICKEL (UG/L)			DET'N LIMIT = 0.100		GUIDELINE = 50. (F3)					

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM HAWKESBURY WTP 1989

SITE TYPE	RAW	TREATED	WATER TREATMENT PLANT SITE 1 STANDING	WATER TREATMENT PLANT SITE 1 FREE FLOW	DISTRIBUTION SYSTEM SITE 3 STANDING	DISTRIBUTION SYSTEM SITE 3 FREE FLOW	DISTRIBUTION SYSTEM SITE 2 STANDING	DISTRIBUTION SYSTEM SITE 2 FREE FLOW	DISTRIBUTION SYSTEM SITE 4 STANDING	DISTRIBUTION SYSTEM SITE 4 FREE FLOW
APR	1.500 <T	.580 <T	4.000	.520 <T	.	.	.	.	1.200 <T	.460 <1
MAY	.560 <T	.980 <T	1.800 <T	.820 <T	.	.	.	.	.860 <T	.720 <1
	1.400 <T	1.200 <T	1.500 <T	.870 <T	.	.	.750 <T	1.200 <T	.	.
JUL	.580 <T	BDL	BDL	BDL	.	.	1.000 <T	BDL	.	.
AUG	.970 <T	.710 <T	.	.	.590 <T	.520 <T	3.100	.450 <T	.	.
SEP	1.100 <T	.720 <T	.930 <T	.730 <T	.	.	2.200	.890 <T	.	.
OCT	.670 <T	.400 <T	1.600 <T	.270 <T	.	.	.280 <T	.180 <T	.	.
NOV	BDL	BDL	13.000	3.500	.	.	BDL	BDL	.	.
DEC	.500 <T	BDL	.640 <T	BDL	.	.	10.000	.320 <T	.	.
LEAD (UG/L)			DET'N LIMIT = 0.050		GUIDELINE = 50. (A1)					
APR	1.100	.160 <T	1.000	.390	.	.	.	.	1.700	.410
MAY	.830	.030 <T	.710	.220	.	.	.	.	4.300	.240
	.980	.130 <T	.530	.260	.	.	3.400	.310	.	.
JUL	1.300	BDL	1.500	.660	.	.	2.400	.890	.	.
AUG	1.100	.340	.	.	3.100	3.500	3.900	1.100	.	.
SEP	.980	.390	1.700	.860	.	.	5.500	.990	.	.
OCT	.830	.110 <T	1.300	.260	.	.	3.900	.880	.	.
NOV	.030 <T	.240	.180 <T	.230	.	.	6.000	.240	.	.
DEC	.330 <T	BDL	1.300	.500 <T	.	.	2.700	.420 <T	.	.
ANTIMONY (UG/L)			DET'N LIMIT = .050		GUIDELINE = 146. (D4)					
APR	.330	.540	.460	.370	.	.	.	.	.510	.420
MAY	.530	.680	.520	.570	.	.	.	.	.550	.590
	.790	.770	.840	.970	.	.	.940	.820	.	.
JUL	.590	.740	.460	.550	.	.	.580	.670	.	.

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM HAWKESBURY WTP 1989

SITE TYPE	RAW	TREATED	WATER TREATMENT PLANT SITE 1 STANDING	SITE 1 FREE FLOW	SITE 3 STANDING	SITE 3 FREE FLOW	DISTRIBUTION SYSTEM SITE 2 STANDING	SITE 2 FREE FLOW	SITE 4 STANDING	SITE 4 FREE FLOW
AUG	.610	.600	.	.	.580	.600	.670	.600	.	.
SEP	.450	.480	.510	.490	.	.	.520	.570	.	.
OCT	.600	.540	.500	.540	.	.	.530	.570	.	.
NOV	.710	.490	.440	.370	.	.	.480	.580	.	.
DEC	.380 <T	.590	.410 <T	.470 <T	.	.	.340 <T	.420 <T	.	.
SELENIUM (UG/L)			DET'N LIMIT = 0.200		GUIDELINE = 10. (A1)					
APR	.350 <T	BDL	BDL	BDL	.	.	.	.	.310 <T	.480 <T
MAY	BDL	1.300 <T	.940 <T	.660 <T	.	.	.	.	1.600 <T	BDL
	1.700 <T	1.300 <T	1.800 <T	1.300 <T	.	.	.370 <T	BDL		.
JUL	BDL	BDL	1.800 <T	BDL	.	.	1.200 <T	1.100 <T	.	.
AUG	2.100 <T	1.900 <T	.	.	2.300 <T	2.500 <T	2.400 <T	1.300 <T	.	.
SEP	BDL	BDL	BDL	BDL	.	.	BDL	BDL	.	.
OCT	BDL	BDL	BDL	BDL	.	.	BDL	BDL	.	.
NOV	BDL	BDL	BDL	BDL	.	.	BDL	BDL	.	.
DEC	BDL	BDL	BDL	BDL	.	.	BDL	BDL	.	.
STRONTIUM (UG/L)			DET'N LIMIT = .050		GUIDELINE = N/A					
APR	63.000	76.000	75.000	74.000	.	.	.	.	76.000	75.000
MAY	53.000	64.000	59.000	57.000	.	.	.	.	57.000	57.000
	57.000	68.000	64.000	66.000	.	.	66.000	61.000	.	.
JUL	45.000	55.000	57.000	57.000	.	.	56.000	56.000	.	.
AUG	44.000	56.000	.	.	56.000	55.000	56.000	58.000	.	.
SEP	47.000	54.000	54.000	55.000	.	.	58.000	52.000	.	.
OCT	50.000	65.000	63.000	58.000	.	.	57.000	56.000	.	.
NOV	61.000	71.000	68.000	69.000	.	.	72.000	72.000	.	.

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM HAWKESBURY WTP 1989

SITE TYPE	RAW	TREATED	WATER TREATMENT PLANT SITE 1 STANDING	SITE 1 FREE FLOW	DISTRIBUTION SYSTEM SITE 3 STANDING	SITE 3 FREE FLOW	SITE 2 STANDING	SITE 2 FREE FLOW	SITE 4 STANDING	SITE 4 FREE FLOW
DEC	55.000	60.000	57.000	56.000	.	.	56.000	55.000	.	.
TITANIUM (UG/L)			DET'N LIMIT = .050		GUIDELINE = N/A					
APR	30.000	8.300	10.000	8.300	.	.	.	.	7.900	8.200
MAY	10.000	5.900	5.900	5.200	.	.	.	.	5.400	3.700
	19.000	10.000	12.000	9.600	.	.	11.000	8.100	.	.
JUL	22.000	9.200	13.000	10.000	.	.	9.500	9.700	.	.
AUG	10.000	5.400	.	.	5.800	5.800	6.000	5.500	.	.
SEP	9.700	6.500	6.700	6.000	.	.	6.400	5.900	.	.
OCT	9.200	5.600	5.600	4.500	.	.	4.900	4.600	.	.
NOV	3.300	12.000	6.200	6.100	.	.	6.100	4.400	.	.
DEC	11.000	7.600	7.100	6.600	.	.	6.100	6.200	.	.
THALLIUM (UG/L)			DET'N LIMIT = .010		GUIDELINE = 13. (D4)					
APR	.200 <T	.130 <T	.170 <T	.190 <T	.	.	.	.	.220	.210
MAY	.040 <T	BDL	.020 <T	BDL	.	.	.	.	BDL	BDL
	.030 <T	BDL	.030 <T	BDL	.	.	.050 <T	BDL	.	.
JUL	.020 <T	BDL	BDL	BDL	.	.	BDL	BDL	.	.
AUG	BDL	BDL	.	.	BDL	BDL	BDL	BDL	.	.
SEP	BDL	BDL	.020 <T	BDL	.	.	BDL	BDL	.	.
OCT	BDL	BDL	BDL	.020 <T	.	.	.020 <T	BDL	.	.
NOV	BDL	BDL	BDL	BDL	.	.	BDL	BDL	.	.
DEC	BDL	BDL	BDL	BDL	.	.	BDL	BDL	.	.
URANIUM (UG/L)			DET'N LIMIT = .020		GUIDELINE = 20. (A2)					
APR	.270	BDL	BDL	BDL	.	.	.	.	BDL	BDL

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM HAWKESBURY WTP 1989

SITE TYPE	RAW	TREATED	WATER TREATMENT PLANT SITE 1 STANDING	SITE 1 FREE FLOW	DISTRIBUTION SYSTEM SITE 3 STANDING	SITE 3 FREE FLOW	SITE 2 STANDING	SITE 2 FREE FLOW	SITE 4 STANDING	SITE 4 FREE FLOW
MAY	.190 <T	.040 <T	BDL	BDL	.	.	.	.	BDL	BDL
	.210	.070 <T	.070 <T	.070 <T	.	.	.040 <T	.070 <T	.	.
JUL	.110 <T	BDL	.030 <T	.080 <T	.	.	BDL	.300	.	.
AUG	.170 <T	.130 <T	.	.	.090 <T	.040 <T	.060 <T	BDL	.	.
SEP	.120 <T	.030 <T	BDL	BDL	.	.	BDL	BDL	.	.
OCT	.040 <T	BDL	BDL	BDL	.	.	.030 <T	BDL	.	.
NOV	.090 <T	.070 <T	.050 <T	.050 <T	.	.	BDL	BDL	.	.
DEC	.110 <T	BDL	BDL	BDL	.	.	BDL	BDL	.	.
VANADIUM (UG/L)			DET'N LIMIT = .050		GUIDELINE = N/A					
APR	1.600	.960	1.200	.930	.	.	.	.	.970	.970
MAY	.580	.970	.860	.850	.	.	.	.	.990	.750
	.970	1.200	1.200	1.100	.	.	1.400	1.100	.	.
JUL	.890	1.100	1.100	1.100	.	.	1.100	1.100	.	.
AUG	.710	1.100	.	.	.840	.800	.940	.720	.	.
SEP	.640	.840	.860	.880	.	.	.770	.750	.	.
OCT	.580	.840	.810	.850	.	.	.910	.870	.	.
NOV	.450 <T	1.100	.800	.800	.	.	.780	.650	.	.
DEC	.440 <T	.530	.490 <T	.520	.	.	.390 <T	.380 <T	.	.
ZINC (UG/L)			DET'N LIMIT = .001		GUIDELINE = 5000. (A3)					
APR	9.700	4.400	7.600	4.500	.	.	.	.	12.000	5.600
MAY	11.000	3.600	8.000	3.600	.	.	.	.	8.200	2.300
	7.400	3.200	5.800	2.700	.	.	6.900	2.200	.	.
JUL	6.300	4.800	7.000	3.300	.	.	8.700	3.800	.	.
AUG	6.100	2.600	.	.	5.000	3.400	11.000	4.500	.	.

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM HAWKESBURY WTP 1989

SITE TYPE	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM							
	RAW	TREATED	SITE 1		SITE 3		SITE 2		SITE 4	
			STANDING	FREE FLOW	STANDING	FREE FLOW	STANDING	FREE FLOW	STANDING	FREE FLOW
SEP	4.700	4.500	8.000	2.700	.	.	17.000	3.700	.	.
OCT	4.000	2.100	6.500	1.700	.	.	9.900	1.900	.	.
NOV	.770 <T	4.000	3.600	3.200	.	.	11.000	2.200	.	.
DEC	3.800	4.200	15.000	5.200	.	.	13.000	5.300	.	.

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM HAWKESBURY WTP 1989

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1	SITE 3	SITE 2	SITE 4
			FREE FLOW	FREE FLOW	FREE FLOW	FREE FLOW
CHLOROPHENOLS						
2356 T-CHLOROPHENOL (NG/L)				DET'N LIMIT = 10. GUIDELINE = N/A		
NOV	20.000 <T	BDL	.	.	.	.
246-TRICHLOROPHENOL (NG/L)				DET'N LIMIT = 20. GUIDELINE = 5000 (B1)		
NOV	80.000 <T	80.000 <T	.	.	.	.

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM HAWKESBURY WTP 1989

SITE		WATER TREATMENT PLANT	DISTRIBUTION SYSTEM							
	RAW	TREATED	SITE 1		SITE 3		SITE 2		SITE 4	
TYPE			[illegible]NG	[illegible]	[illegible]NG	[illegible]	[illegible]NG	[illegible]	STANDING	FREE FLOW
PESTICIDES & PCB										
ALPHA BHC (NG/L)			DET'N LIMIT = 1.000		GUIDELINE = 700 (G)					
APR	BDL	BDL	.	BDL	.	.	.	.	.	BDL
MAY	BDL	BDL	.	BDL	.	.	.	.	.	BDL
	BDL	BDL	.	BDL	.	.	.	!IS	.	.
JUL	!RE	1.000 <T	.	.	.	BDL	.	BDL	.	.
AUG	BDL	BDL	.	BDL	.	.	.	BDL	.	.
SEP	BDL	BDL	.	!QU	.	.	.	!QU	.	.
OCT	!QU	!QU	.	2.000 <T	.	.	.	2.000 <T	.	.
NOV	2.000 <T	1.000 <T	.	BDL	.	.	.	BDL	.	.
DEC	!LA	BDL	.		.	.	.		.	.

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM HAWKESBURY WTP 1989

SITE			WATER TREATMENT PLANT		DISTRIBUTION SYSTEM					
	RAW	TREATED	SITE 1		SITE 3		SITE 2		SITE 4	
TYPE			STANDING	FREE FLOW	STANDING	FREE FLOW	STANDING	FREE FLOW	STANDING	FREE FLOW
PHENOLICS (UG/L PHENOLICS)			DETN LIMIT = 0.2		GUIDELINE = 2.00 (A3)					
APR	6.600	3.000	.	.	.	.	.	.	.	.
MAY	4.200	2.600	.	.	.	.	.	.	.	.
	2.600	1.600	.	.	.	.	.	.	.	.
JUL	1.800	1.600	.	.	.	.	.	.	.	.
AUG	1.200	1.000 <T	.	.	.	.	.	.	.	.
SEP	2.200	1.600	.	.	.	.	.	.	.	.
OCT	3.200	1.800	.	.	.	.	.	.	.	.
NOV	1.400	1.400	.	.	.	.	.	.	.	.
DEC	1.600	1.000 <T	.	.	.	.	.	.	.	.

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM HAWKESBURY WTP 1989

SITE TYPE	RAW	TREATED	WATER TREATMENT PLANT SITE 1 STANDING	WATER TREATMENT PLANT SITE 1 FREE FLOW	WATER TREATMENT PLANT SITE 3 STANDING	WATER TREATMENT PLANT SITE 3 FREE FLOW	DISTRIBUTION SYSTEM SITE 2 STANDING	DISTRIBUTION SYSTEM SITE 2 FREE FLOW	DISTRIBUTION SYSTEM SITE 4 STANDING	DISTRIBUTION SYSTEM SITE 4 FREE FLOW
VOLATILES										
BENZENE (UG/L)			DET'N LIMIT = .050		GUIDELINE = 5.0 (B1)					
APR	BDL	BDL	.	BDL	.	.	.	.	.	BDL
MAY	BDL	BDL	.	BDL	.	.	.	.	.	BDL
	BDL	BDL	.	BDL	.	.	.	BDL	.	.
JUL	BDL	BDL	.	BDL	.	.	.	IU	.	.
AUG	BDL	BDL	.	.	.	BDL	.	BDL	.	.
SEP	BDL	.050 <T	.	BDL	.	.	.	BDL	.	.
OCT	BDL	BDL	.	BDL	.	.	.	BDL	.	.
NOV	BDL	BDL	.	BDL	.	.	.	BDL	.	.
DEC	BDL	BDL	.	.150 <T	.	.	.	BDL	.	.
TOLUENE (UG/L)			DET'N LIMIT = .050		GUIDELINE = 24.0 (B4)					
APR	BDL	.100 <T	.	.100 <T	.	.	.	.	.	BDL
MAY	BDL	BDL	.	.050 <T	.	.	.	.	.	BDL
	BDL	.050 <T	.	.050 <T	.	.	.	BDL	.	.
JUL	BDL	BDL	.	BDL	.	.	.	IU	.	.
AUG	BDL	.200 <T	.	.	.	.100 <T	.	.150 <T	.	.
SEP	BDL	.100 <T	.	.100 <T	.	.	.	.050 <T	.	.
OCT	BDL	.050 <T	.	.050 <T	.	.	.	BDL	.	.
NOV	BDL	BDL	.	BDL	.	.	.	BDL	.	.
DEC	BDL	BDL	.	BDL	.	.	.	BDL	.	.
ETHYLBENZENE (UG/L)			DET'N LIMIT = .050		GUIDELINE = 2.4 (B4)					
APR	BDL	.100 <T	.	BDL	.	.	.	.	.	.050
MAY	BDL	BDL	.	BDL	.	.	.	.	.	BDL

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM HAWKESBURY WTP 1989

SITE			WATER TREATMENT PLANT				DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 3		SITE 2		SITE 4	
TYPE			STANDING	FREE FLOW	STANDING	FREE FLOW	STANDING	FREE FLOW	STANDING	FREE FLOW
MAY	BDL	BDL	.	BDL	.	.	.	BDL	.	.
JUL	BDL	BDL	.	BDL	.	.	.	IU	.	.
AUG	BDL	.050 <T	.	.	.	BDL	.	BDL	.	.
SEP	BDL	BDL	.	BDL	.	.	.	BDL	.	.
OCT	BDL	BDL	.	BDL	.	.	.	BDL	.	.
NOV	BDL	BDL	.	BDL	.	.	.	BDL	.	.
DEC	BDL	.050 <T	.	.050 <T	.	.	.	.050 <T	.	.
O-XYLENE (UG/L)			DET'N LIMIT = .050		GUIDELINE = 300 (B4)					
APR	BDL	BDL	.	.050 <T	.	.	.	.	.	BDL
MAY	BDL	BDL	.	BDL	.	.	.	.	.	BDL
	BDL	BDL	.	BDL	.	.	.	BDL	.	.
JUL	BDL	BDL	.	BDL	.	.	.	IU	.	.
AUG	BDL	BDL	.	.	.	BDL	.	BDL	.	.
SEP	BDL	BDL	.	BDL	.	.	.	BDL	.	.
OCT	BDL	BDL	.	BDL	.	.	.	BDL	.	.
NOV	BDL	BDL	.	BDL	.	.	.	.100 <T	.	.
DEC	BDL	BDL	.	BDL	.	.	.	BDL	.	.
STYRENE (UG/L)			DET'N LIMIT = .050		GUIDELINE = 46.5 (D2)					
APR	BDL	.400 <T	.	.150 <T	.	.	.	.	.	.350
MAY	.050 <T	.100 <T	.	.200 <T	.	.	.	.	.	.100
	BDL	.400 <T	.	.300 <T	.	.	.	.250 <T	.	.
JUL	BDL	.100 <T	.	.250 <T	.	.	.	IU	.	.
AUG	BDL	.300 <T	.	.	.	.150 <T	.	.300 <T	.	.
SEP	BDL	.050 <T	.	BDL	.	.	.	BDL	.	.

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM HAWKESBURY WTP 1989

SITE TYPE	RAW	TREATED	WATER TREATMENT PLANT SITE 1 STANDING	SITE 1 FREE FLOW	SITE 3 STANDING	SITE 3 FREE FLOW	DISTRIBUTION SYSTEM SITE 2 STANDING	SITE 2 FREE FLOW	SITE 4 STANDING	SITE 4 FREE FLOW
OCT	BDL	BDL	.	BDL	.	.	.	.050 <T	.	.
NOV	BDL	.100 <T	.	BDL	.	.	.	.050 <T	.	.
DEC	BDL	.250 <T	.	.150 <T	.	.	.	.350 <T	.	.
CHLOROFORM (UG/L)			DET'N LIMIT = .100		GUIDELINE = 350 (A1+)					
APR	.500 <T	1.700	.	1.800	.	.	.	.	.	1.600
MAY	BDL	47.300	.	45.900	.	.	.	.	.	44.200
	.400 <T	70.600	.	67.600	.	.	.	57.900	.	.
JUL	.400 <T	78.700	.	78.100	.	.	.	IU	.	.
AUG	.400 <T	101.000	.	.	.	84.000	.	67.000	.	.
SEP	.200 <T	68.300	.	57.100	.	.	.	50.700	.	.
OCT	.300 <T	80.000	.	53.700	.	.	.	50.700	.	.
NOV	BDL	46.300	.	44.900	.	.	.	49.000	.	.
DEC	.300 <T	50.900 APS	.	27.200 APS	.	.	.	26.000 APS	.	.
111, TRICHLOROETHANE (UG/L)			DET'N LIMIT = .020		GUIDELINE = 200 (D1)					
APR	.040 <T	.040 <T	.	.020 <T	.	.	.	.	.	BDL
MAY	BDL	BDL	.	BDL	.	.	.	.	.	BDL
	BDL	BDL	.	BDL	.	.	.	BDL	.	.
JUL	BDL	BDL	.	BDL	.	.	.	IU	.	.
AUG	.020 <T	BDL	.	.	.	BDL	.	.040 <T	.	.
SEP	BDL	BDL	.	BDL	.	.	.	BDL	.	.
OCT	BDL	BDL	.	BDL	.	.	.	BDL	.	.
NOV	BDL	BDL	.	BDL	.	.	.	BDL	.	.
DEC	BDL	BDL	.	BDL	.	.	.	BDL	.	.

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM HAWKESBURY WTP 1989

SITE TYPE	RAW	TREATED	WATER TREATMENT PLANT SITE 1 STANDING	SITE 1 FREE FLOW	SITE 3 STANDING	SITE 3 FREE FLOW	DISTRIBUTION SYSTEM SITE 2 STANDING	SITE 2 FREE FLOW	SITE 4 STANDING	SITE 4 FREE FLOW
TRICHLOROETHYLENE (UG/L)			DET'N LIMIT = .100		GUIDELINE = 5.0 (D1)					
APR	BDL	BDL	.	BDL	.	.	.	.	.	BDL
MAY	BDL	BDL	.	BDL	.	.	.	.	.	BDL
	BDL	BDL	.	BDL	.	.	.	BDL	.	.
JUL	BDL	BDL	.	BDL	.	.	.	IU	.	.
AUG	BDL	BDL	.	.	.	BDL	.	BDL	.	.
SEP	BDL	BDL	.	BDL	.	.	.	BDL	.	.
OCT	BDL	BDL	.	BDL	.	.	.	.200 <T	.	.
NOV	BDL	BDL	.	BDL	.	.	.	BDL	.	.
DEC	BDL	BDL	.	BDL	.	.	.	BDL	.	.
DICHLOROBROMOMETHANE (UG/L)			DET'N LIMIT = .050		GUIDELINE = 350 (A1+)					
APR	BDL	.100 <T	.	.150 <T	.	.	.	.	.	.100 <T
MAY	BDL	1.400	.	1.500	.	.	.	.	.	1.400
	BDL	1.650	.	1.550	.	.	.	1.400	.	.
JUL	BDL	1.900	.	1.750	.	.	.	IU	.	.
AUG	BDL	2.800	.	.	.	3.000	.	2.500	.	.
SEP	BDL	2.300	.	2.200	.	.	.	2.000	.	.
OCT	BDL	2.100	.	1.750	.	.	.	1.600	.	.
NOV	BDL	2.150	.	3.000	.	.	.	2.700	.	.
DEC	BDL	1.900	.	1.250	.	.	.	1.200	.	.
CHLORODIBROMOMETHANE (UG/L)			DET'N LIMIT = .100		GUIDELINE = 350 (A1+)					
APR	BDL	BDL	.	BDL	.	.	.	.	.	BDL
MAY	BDL	BDL	.	BDL	.	.	.	.	.	BDL
	BDL	.100 <T	.	BDL	.	.	.	BDL	.	.

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM HAWKESBURY WTP 1989

SITE TYPE	RAW	TREATED	WATER TREATMENT PLANT SITE 1		DISTRIBUTION SYSTEM SITE 3		SITE 2		SITE 4	
			STANDING	FREE FLOW	STANDING	FREE FLOW	STANDING	FREE FLOW	STANDING	FREE FLOW
JUL	BDL	BDL	.	.100 <T	.	.	.	IU	.	.
AUG	BDL	.100 <T	.	.	.	BDL	.	BDL	.	.
SEP	BDL	BDL	.	BDL	.	.	.	BDL	.	.
OCT	BDL	BDL	.	BDL	.	.	.	BDL	.	.
NOV	BDL	BDL	.	.100 <T	.	.	.	.200 <T	.	.
DEC	BDL	BDL	.	BDL	.	.	.	BDL	.	.
T-CHLOROETHYLENE (UG/L)			DET'N LIMIT = .050		GUIDELINE = 10.0 (C2)					
APR	BDL	BDL	.	.050 <T	.	.	.	.	.	.050 <T
MAY	BDL	BDL	.	BDL	.	.	.	.	.	BDL
	BDL	BDL	.	BDL	.	.	.	BDL	.	.
JUL	BDL	BDL	.	BDL	.	.	.	IU	.	.
AUG	BDL	.100 <T	.	.	.	BDL	.	BDL	.	.
SEP	BDL	BDL	.	BDL	.	.	.	BDL	.	.
OCT	BDL	BDL	.	BDL	.	.	.	BDL	.	.
NOV	BDL	BDL	.	BDL	.	.	.	BDL	.	.
DEC	BDL	BDL	.	BDL	.	.	.	BDL	.	.
1,4 DICHLOROBENZENE (UG/L)			DET'N LIMIT = .100		GUIDELINE = 5.0 (B1)					
APR	BDL	BDL	.	BDL	.	.	.	.	.	BDL
MAY	BDL	BDL	.	BDL	.	.	.	.	.	BDL
	BDL	BDL	.	BDL	.	.	.	BDL	.	.
JUL	BDL	BDL	.	BDL	.	.	.	IU	.	.
AUG	BDL	BDL	.	.	.	BDL	.	BDL	.	.
SEP	BDL	BDL	.	BDL	.	.	.	BDL	.	.
OCT	BDL	BDL	.	.200 <T	.	.	.	BDL	.	.

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM HAWKESBURY WTP 1989

SITE TYPE	RAW	TREATED	WATER TREATMENT PLANT SITE 1 STANDING	SITE 1 FREE FLOW	SITE 3 STANDING	SITE 3 FREE FLOW	DISTRIBUTION SYSTEM SITE 2 STANDING	SITE 2 FREE FLOW	SITE 4 STANDING	SITE 4 FREE FLOW
NOV	BDL	BDL	.	BDL	.	.	.	BDL	.	.
DEC	BDL	BDL	.	BDL	.	.	.	BDL	.	.
TOTL TRIHALOMETHANES (UG/L)			DET'N LIMIT = .500		GUIDELINE = 350 (A1)					
APR	.500 <T	1.800 <T	.	1.950 <T	.	.	.	.	.	1.700 <T
MAY	BDL	48.700	.	47.400	.	.	.	.	.	45.600
	BDL	72.350	.	69.150	.	.	.	59.300	.	.
JUL	BDL	80.600	.	79.950	.	.	.	IU	.	.
AUG	BDL	103.900	.	.	.	87.000	.	69.500	.	.
SEP	BDL	70.600	.	59.300	.	.	.	52.700	.	.
OCT	BDL	82.100	.	55.450	.	.	.	52.300	.	.
NOV	BDL	48.450	.	48.000	.	.	.	51.900	.	.
DEC	BDL	52.850	.	28.450	.	.	.	27.250	.	.

TRACE LEVELS OF TOLUENE ARE LABORATORY ARTIFACTS DERIVED FROM THE ANALYTICAL METHODOLOGY.

TRACE LEVELS OF STYRENE ARE CONSIDERED TO BE LABORATORY ARTIFACTS RESULTING FROM THE LABORATORY SHIPPING CONTAINERS.

Table 6

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE
BACTERIOLOGICAL			
STANDARD PLATE COUNT MEMBRANE FILTRATION	CT/ML	0	500/ML(A1)
P/A BOTTLE		0	0 (A1*)
TOTAL COLIFORM MEMBRANE FILTRATION	CT/100ML	0	5/100mL(A1)
TOTAL COLIFORM BACKGROUND MF	CT/100ML	0	N/A
CHLOROAROMATICS			
HEXACHLOROBUTADIENE	NG/L	1.000	450. (D4)
1,2,3-TRICHLOROBENZENE	NG/L	5.000	10000 (I)
1,2,3,4-TETRACHLOROBENZENE	NG/L	1.000	10000 (I)
1,2,3,5-TETRACHLOROBENZENE	NG/L	1.000	10000 (I)
1,2,4-TRICHLOROBENZENE	NG/L	5.000	10000 (I)
1,2,4,5-TETRACHLOROBENZENE	NG/L	1.000	38000 (D4)
1,3,5-TRICHLOROBENZENE	NG/L	5.000	10000 (D4)
HEXACHLOROBENZENE	NG/L	1.0	10. (C1)
HEXACHLOROETHANE	NG/L	1.000	1900. (D4)
OCTACHLOROSTYRENE	NG/L	1.000	N/A
PENTACHLOROBENZENE	NG/L	1.000	74000 (D4)
2,3,6-TRICHLOROTOLUENE	NG/L	5.000	N/A
2,4,5-TRICHLOROTOLUENE	NG/L	5.000	N/A
2,6,A-TRICHLOROTOLUENE	NG/L	5.000	N/A
CHLOROPHENOLS			
2,3,4-TRICHLOROPHENOL	NG/L	50.	N/A
2,3,4,5-TETRACHLOROPHENOL	NG/L	50.	N/A
2,3,5,6-TETRACHLOROPHENOL	NG/L	50.	N/A
2,4,5-TRICHLOROPHENOL	NG/L	50.	2600000 (D4)
2,4,6-TRICHLOROPHENOL	NG/L	50.	2000. (B4)
PENTACHLOROPHENOL	NG/L	50.	30000. (B4)
CHEMISTRY (FLD)			
FIELD COMBINED CHLORINE RESIDUAL	MG/L	N/A	N/A
FIELD FREE CHLORINE RESIDUAL	MG/L	N/A	N/A
FIELD TOTAL CHLORINE RESIDUAL	MG/L	N/A	N/A
FIELD PH	DMSNLESS	N/A	6.5-8.5(A4)
FIELD TEMPERATURE	^{o}C	N/A	<15 ^{o}C(A1)
FIELD TURBIDITY	FTU	N/A	1.0 (A1)
CHEMISTRY (LAB)			
ALKALINITY	MG/L	.200	30-500(A4)
CALCIUM	MG/L	.100	100. (F2)
CYANIDE	MG/L	.001	.20(A1)
CHLORIDE	MG/L	.200	250. (A3)
COLOUR	TCU	.5	5.0 (A3)
CONDUCTIVITY	UMHO/CM	1.	400. (F2)
FLUORIDE	MG/L	.01	2.4 (A1)
HARDNESS	MG/L	.50	80-100(A4)
MAGNESIUM	MG/L	.05	30. (F2)

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE
NITRITE	MG/L	.001	1.0 (A1)
TOTAL NITRATES	MG/L	.02	10. (A1)
NITROGEN TOTAL KJELDAHL	MG/L	.02	N/A
PH	DMSNLESS	N/A	6.5-8.5(A4)
PHOSPHORUS FIL REACT	MG/L	.0005	N/A
PHOSPHORUS TOTAL	MG/L	.002	.40(F2)
TOTAL SOLIDS	MG/L	1.	500. (A3)
TURBIDITY	FTU	.02	1.0 (A1)
METALS			
ALUMINUM	UG/L	.050	100. (A4)
ANTIMONY	UG/L	.050	10. (F3)
ARSENIC	UG/L	.050	50. (A1)
BARIUM	UG/L	.020	1000. (A1)
BORON	UG/L	.200	5000. (A1)
BERYLLIUM	UG/L	.010	0.20 (H)
CADMIUM	UG/L	.050	5.0 (A1)
COBALT	UG/L	.020	1000. (H)
CHROMIUM	UG/L	.100	50. (A1)
COPPER	UG/L	.100	1000. (A3)
IRON	UG/L	5.0	300. (A3)
MERCURY	UG/L	.01	1.0 (A1)
MANGANESE	UG/L	.050	50. (A3)
MOLYBDENUM	UG/L	.020	500. (H)
NICKEL	UG/L	.100	50. (F3)
LEAD	UG/L	.020	50. (A1)
SELENIUM	UG/L	.200	10. (A1)
SILVER	UG/L	.020	50. (A1)
STRONTIUM	UG/L	.100	2000. (H)
THALLIUM	UG/L	.010	13. (D4)
TITANIUM	UG/L	.100	N/A
URANIUM	UG/L	.020	20. (A2)
VANADIUM	UG/L	.020	100. (H)
ZINC	UG/L	.020	5000. (A3)
PHENOLICS			
PHENOLICS (UNFILTERED REACTIVE)	UG/L	.2	2.0 (A3)
PESTICIDES & PCB			
ALDRIN	NG/L	1.0	700. (A1)
AMETRINE	NG/L	50.	300000. (D3)
ATRAZINE	NG/L	50.	60000. (B3)
ALPHA HEXACHLOROCYCLOHEXANE (BHC)	NG/L	1.0	700. (G)
BETA HEXACHLOROCYCLOHEXANE (BHC)	NG/L	1.0	300. (G)
GAMMA HEXACHLOROCYCLOHEXANE(LINDANE)	NG/L	1.0	4000. (A1)
ALPHA CHLORDANE	NG/L	2.0	7000. (A1)
GAMMA CHLORDANE	NG/L	2.0	7000. (A1)
BLADEX	NG/L	100.	10000. (B3)
DIELDRIN	NG/L	2.0	700. (A1)
METHOXYCHLOR	NG/L	5.0	900000. (B1)
ENDOSULFAN 1 (THIODAN I)	NG/L	2.0	74000. (D4)
ENDOSULFAN 2 (THIODAN II)	NG/L	4.0	74000. (D4)
ENDRIN	NG/L	4.0	200. (A1)
ENDOSULFAN SULPHATE(THIODAN SULPHATE)	NG/L	4.0	N/A
HEPTACHLOR EPOXIDE	NG/L	1.0	3000. (A1)

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE	
HEPTACHLOR	NG/L	1.0	3000.	(A1)
METOLACHLOR	NG/L	500.	50000.	(B3)
MIREX	NG/L	5.0	N/A	
OXYCHLORDANE	NG/L	2.0	N/A	
O,P-DDT	NG/L	5.0	30000.	(A1)
PCB	NG/L	20.0	3000.	(A2)
O,P-DDD	NG/L	5.0	N/A	
PPDDE	NG/L	1.0	30000.	(A1)
PPDDT	NG/L	5.0	30000.	(A1)
ATRATONE	NG/L	50.	N/A	
ALACHLOR	NG/L	500.	35000.	(D2)
PROMETONE	NG/L	50.	52500.	(D3)
PROPAZINE	NG/L	50.	16000.	(D2)
PROMETRYNE	NG/L	50.	1000.	(B3)
SENCOR (METRIBUZIN)	NG/L	100.	80000.	(B2)
SIMAZINE	NG/L	50.	10000.	(B3)
POLYAROMATIC HYDROCARBONS				
PHENANTHRENE	NG/L	10.0	N/A	
ANTHRACENE	NG/L	1.0	N/A	
FLUORANTHENE	NG/L	20.0	42000.	(D4)
PYRENE	NG/L	20.0	N/A	
BENZO(A)ANTHRACENE	NG/L	20.0	N/A	
CHRYSENE	NG/L	50.0	N/A	
DIMETHYL BENZO(A)ANTHRACENE	NG/L	5.0	N/A	
BENZO(E)PYRENE	NG/L	50.0	N/A	
BENZO(B)FLUORANTHENE	NG/L	10.0	N/A	
PERYLENE	NG/L	10.0	N/A	
BENZO(K)FLUORANTHENE	NG/L	1.0	N/A	
BENZO(A)PYRENE	NG/L	5.0	10.	(B1)
BENZO(G,H,I)PERYLENE	NG/L	20.0	N/A	
DIBENZO(A,H)ANTHRACENE	NG/L	10.0	N/A	
INDENO(1,2,3-C,D)PYRENE	NG/L	20.0	N/A	
BENZO(B)CHRYSENE	NG/L	2.0	N/A	
CORONENE	NG/L	10.0	N/A	
SPECIFIC PESTICIDES				
TOXAPHENE	NG/L	N/A	5000.	(A1)
2,4,5-TRICHLOROBUTYRIC ACID	NG/L	50.	200000.	(B4)
(2,4,5-T)	NG/L	100.	100000.	(A1)
2,4-DICHLOROBUTYRIC ACID (2,4-D)	NG/L	200.	18000.	(B3)
2,4-DICHLORORPHENOXYBUTYRIC ACID	NG/L	100.	N/A	
2,4-D PROPIONIC ACID	NG/L	100.	120000.	(B1)
DICAMBA	NG/L	100.	190000.	(B3)
PICLORAM	NG/L	50.	10000.	(A1)
SILVEX (2,4,5-TP)	NG/L	20.	20000.	(B1)
DIAZINON	NG/L	20.	N/A	
DICHLOROVOS	NG/L	20.	N/A	
DURSBAN	NG/L	20.	35000.	(G)
ETHION	NG/L	N/A	20000.	(B1)
GUTHION(AZINPHOSMETHYL)	NG/L	20.	190000.	(B1)
MALATHION	NG/L	20.	N/A	
MEVINPHOS	NG/L	50.	7000.	(A1)
METHYL PARATHION	NG/L	20.	N/A	
METHYLTRITHION	NG/L	20.	50000.	(B1)
PARATHION				

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE	
PHORATE (THIMET)	NG/L	20.	2000.	(B3)
RELDAN	NG/L	20.	N/A	
RONNEL	NG/L	20.	N/A	
AMINOCARB	NG/L	N/A	N/A	
BENONYL	NG/L	N/A	N/A	
BUX (METALKAMATE)	NG/L	2000.	N/A	
CARBOFURAN	NG/L	2000.	90000.	(B1)
CICP (CHLORPROPHAM)	NG/L	2000.	350000.	(G)
DIALLATE	NG/L	2000.	30000.	(H)
EPTAM	NG/L	2000.	N/A	
IPC	NG/L	2000.	N/A	
PROPOXUR (BAYGON)	NG/L	2000.	90000.	(G)
SEVIN (CARBARYL)	NG/L	200.	90000.	(B1)
SUTAN (BUTYLATE)	NG/L	2000.	245000.	(D3)
VOLATILES				
BENZENE	UG/L	.050	5.0	(B1)
TOLUENE	UG/L	.050	24.0	(B4)
ETHYLBENZENE	UG/L	.050	2.4	(B4)
PARA-XYLENE	UG/L	.100	300.	(B4)
META-XYLENE	UG/L	.100	300.	(B4)
ORTHO-XYLENE	UG/L	.050	300.	(B4)
1,1-DICHLOROETHYLENE	UG/L	.100	7.0	(D1)
ETHLYENE DIBROMIDE	UG/L	.05	.05	G)
METHYLENE CHLORIDE	UG/L	.500	50.	(B1)
TRANS-1,2-DICHLOROETHYLENE	UG/L	.100	70.	(D5)
1,1-DICHLOROETHANE	UG/L	.100	N/A	
CHLOROFORM	UG/L	.100	350.	(A1+)
1,1,1-TRICHLOROETHANE	UG/L	.020	200.	(D1)
1,2-DICHLOROETHANE	UG/L	.050	5.0	(D1)
CARBON TETRACHLORIDE	UG/L	.200	5.0	(B1)
1,2-DICHLOROPROPANE	UG/L	.050	6.0	(D5)
TRICHLOROETHYLENE	UG/L	.100	50.	(B1)
DICHLOROBROMOMETHANE	UG/L	.050	350.	(A1+)
1,1,2-TRICHLOROETHANE	UG/L	.050	.60	(D4)
CHLORODIBROMOMETHANE	UG/L	.100	350.	(A1+)
TETRACHLOROETHYLENE	UG/L	.050	10.0	(C2)
BROMOFORM	UG/L	.200	350.	(A1+)
1,1,2,2-TETRACHLOROETHANE	UG/L	.050	0.17	(D4)
CHLOROBENZENE	UG/L	.100	60.	(D5)
1,4-DICHLOROBENZENE	UG/L	.100	1.0	(B4)
1,3-DICHLOROBENZENE	UG/L	.100	130.	(G)
1,2-DICHLOROBENZENE	UG/L	.050	3.0	(B4)
TRIFLUOROCHLOROTOLUENE	UG/L	.100	N/A	
TOTAL TRIHALOMETHANES	UG/L	.500	350.	(A1)
STYRENE	UG/L	.05	140.	(D5)

Appendix A

DRINKING WATER SURVEILLANCE PROGRAM

The Drinking Water Surveillance Program (DWSP) for Ontario monitors drinking water quality at municipal water supply systems. The DWSP Database Management System provides a computerized drinking water quality information system for the supplies monitored. The objectives of the program are to provide:

- immediate, reliable, current information on drinking water quality,
- a flagging mechanism for 'Objective' exceedence,
- a definition of contaminant levels and trends,
- a comprehensive background for remedial action,
- a framework for assessment of new contaminants,
- and an indication of treatment efficiency of plant processes.

Program

The DWSP officially began in April 1986 and is designed to eventually include all municipal water supplies in Ontario; currently 44 plants are being monitored. Water supply locations have been prioritized for surveillance, based primarily on criteria such as population density, probability of contamination and geographical location.

An ongoing assessment of future monitoring requirements at each location will be made. Monitoring will continue at the initial locations at an appropriate level and further locations will be phased into the program as resources permit. It is estimated that after 4 years of operation, the program will be monitoring 90 locations.

A major goal of the program is to collect valid water quality data, in context with plant operational characteristics at the time of sampling. As soon as sufficient data have been accumulated and analysed, both the frequency of sampling and the range of parameters may be adjusted accordingly.

Assessments are carried out at all locations prior to initial sampling in order to acquire complete plant process and distribution system details, and to designate (and retrofit if necessary) all sampling systems and locations. This ensures that the sampled water is a reflection of the water itself.

Samples are taken of the raw (ambient water) and the treated water at the treatment plant, and of consumer's tap water in the distribution system. In order to determine possible effects of distribution on water quality, both standing and free flow water in old and new sections of the distribution system are sampled.

Sampling is carried out by operational personnel who have been trained in the applicable procedures.

Comprehensive standardized procedures and Field Test kits are supplied to sampling personnel. This ensures that samples are taken and handled according to standard protocols and that field testing will supply reliable data. All field and laboratory analyses are carried out using "approved documented procedures". All laboratory analyses are carried out by the MOE Laboratory Services Branch.

Data Reporting Mechanism

When the analytical results are transferred from the MOE laboratory into the DWSP system, printouts of the completed analyses are sent to the MOE District Officer, the appropriate operational staff and are also retained by the DWSP co-ordinator.

DWSP INPUTS AND OUTPUTS

The DWSP INPUTS and OUTPUTS are illustrated in Fig. 1.

PROGRAM INPUTS

PLANT AND DISTRIBUTION SYSTEM DESCRIPTION

The system description includes plant specific non-analytical information acquired through a questionnaire and initial plant

visit. During the initial assessment of the plant and distribution system the questionnaire content is verified and missing information added. It is intended that all data be kept current with scheduled annual updates.

The PLANT and DISTRIBUTION SYSTEM DESCRIPTION consists of the following seven components.

1. Process component inventory

All physical and chemical processes that the water is subjected to, from the intake pipe to the consumers' tap (where possible), are documented. These include: process type, general description of physical structures, material types, sizes, and retention time for each process within the plant. The processes may be as simple as transmission or as complex as carbon adsorption.

2. Treatment chemicals

Chemicals used in the treatment processes, their function, application point, supplier and brand-name are recorded. The chemical dosages applied on the day of sampling are recorded in DWSP.

3. Process control measurements

Documentation of in-plant monitoring of process parameters (turbidity, chlorine residuals, pH, aluminum residuals) including methods used, monitoring locations and frequency is contained in

this section. In-plant monitoring results are generally not retained in DWSP but are retained by the Water Treatment Plant.

4. Design flow and retention time

The hydraulic capacity, designed and actual, is noted here. Retention time (the time that a block of water is retained in the plant) is also noted. The maximum, minimum and average flow as well as a record of the flow rate on the day of sampling are recorded in DWSP.

5. Distribution system description

This area includes the storage and transmission characteristics of the distribution system after the water leaves the plant.

6. Sampling system

Each plant is assessed for its adequacy in terms of sampling of bacteriological, organic and inorganic parameters. The prime considerations in the assessment and design of the sampling system are:

i/ the sample is an accurate representation of the actual water condition, eg. raw water has had no chemical treatment;

ii/ the water being sampled is not being modified by the sampling system;

iii/ the sample tap must be in a clean area of the plant,

preferably a lab area;

iv/ the sample lines must be organically inert (no plastic, ideally stainless steel).

It is imperative that the sampled water be a reflection not of the sampling system but of the water itself.

The sampling system documentation includes: origin of the water; date sampling was initiated; size, length and material type (intake, discharge and tap), pump characteristics (model, type, capacity) and flow rate.

7. People

This section contains the names, addresses and phone numbers of current plant management and operational staff, distribution system management and operational staff, Medical Officer of Health and appropriate Ministry of Environment personnel associated with the plant.

FIELD DATA

The second major input to DWSP is field data.

Field data is collected at the plant and from the distribution system sites on the day of sampling. The field data consists of general operating conditions and the results of testing for field parameters. General operating conditions include chemicals used,

dosages, flow and retention time on the day of sampling as well as monthly maximum, minimum and average flows. Field parameters include turbidity, chlorine residuals (free,combined and total), temperature and pH. These parameters are analysed according to standardized DWSP protocols to allow for interplant comparison.

LABORATORY ANALYTICAL DATA

The third major input to DWSP is Laboratory Analytical Data.

Samples gathered from the raw, treated and distribution sampling sites are analyzed for approximately 180 parameters at a frequency of two to twelve times per year. Sixty-five percent of the parameters are organic. The parameters measured may have health or aesthetic implications when present in drinking water. Many of the parameters may be used in the treatment process or may be treatment by-products. Due to the nature of certain analytical instruments parameters may be measured for in a "scan" producing some results for parameters that are not on the DWSP priority list but which may be of interest. The majority of the parameters are measured on a routine basis however, those that are technically more difficult and/or costly to analyse for are done less frequently. These include Specific Pesticides and Chlorophenols.

Although the parameter list is extensive, additional parameters with the potential to cause health or aesthetic related problems

may be added provided reliable analytical and sampling methods exist.

All laboratory generated data is derived from standardized, documented analytical protocols. The analytical method is an integral part of the data and as methods change notation will e be made and intercomparison data documented.

PARAMETER REFERENCE INFORMATION

The fourth major input to DWSP is Parameter Reference Information. This is a catalogue of information for each substance analysed on DWSP. It includes parameter name and aliases, physical and chemical properties, basic toxicology, world-wide health limits, treatment methods and uses. The Parameter Reference Information is computerized and can be accessed through the Query function of the DWSP database.

An example is shown in fig. 2.

A written copy (hard version) of the Parameter Reference Information will be available in the near future and is a new and sophisticated enhancement to the DWSP.

PROGRAM OUTPUTS

There are four major program outputs, Query, Action Alert, Report Generation and the Annual Report.

QUERY

All DWSP information is easily accessed through the Query function, therefore anything from addresses of plant personnel to complete water quality information for a plant's water supply is instantly available. The DWSP computer system makes relatively complex inquiries manageable. A personal password allowing access into the DWSP query mode in all MOE offices is being developed by the DWSP group.

ACTION ALERTS

Drinking Water quality in Ontario is evaluated against provincial objectives as outlined in the publication, Ontario Drinking Water Objectives (ISBN 0-7729-2725-7 revised 1983). This publication contains health-related Maximum Acceptable Concentrations for thirty substances. Should the reported level of a substance in treated water exceed the Ontario Drinking Water Objective an "Action Alert" requiring resampling and confirmation is issued. This assures that operational staff, health authorities and the public are notified as soon as possible of confirmation of an exceedance and remedial action taken. This report supplies a history of the occurrence of past exceedences at the plant plus a historical summary on the parameter of concern.

In the absence of Ontario Drinking Water Objectives, other agency guidelines which are documented in the Parameter Reference

Information may be used. If these guidelines are exceeded the results are flagged and evaluated by DWSP personnel. An "Action Alert" will be issued if warranted.

REPORT GENERATION

Custom reports can be generated from DWSP to meet the needs of the regions and to respond to public requests.

ANNUAL REPORTS

It is the practice of DWSP to produce an annual report containing analytical data along with companion plant information.

FIG. 1

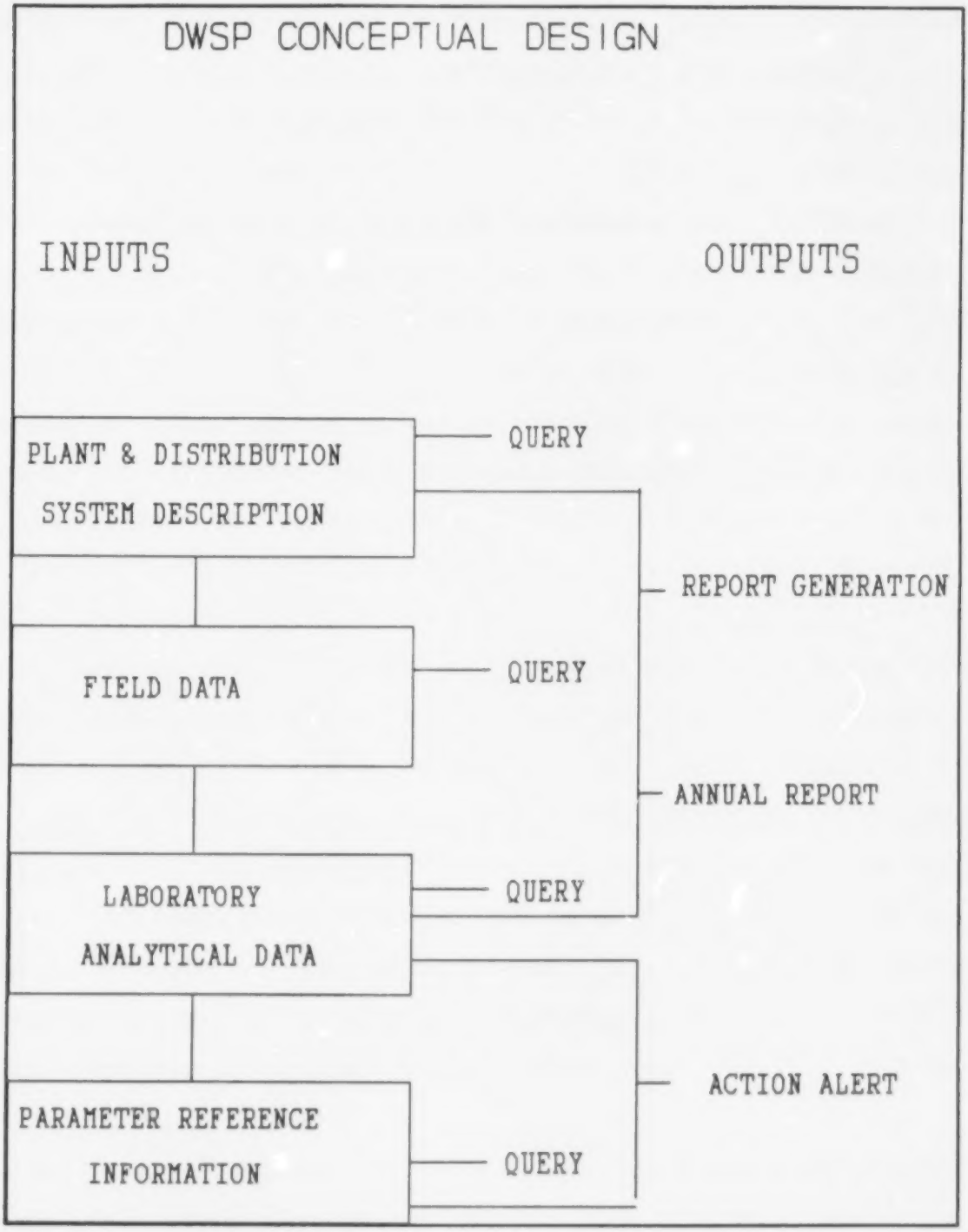
DWSP CONCEPTUAL DESIGN
INPUTS
OUTPUTS
PLANT & DISTRIBUTION SYSTEM DESCRIPTION
FIELD DATA
LABORATORY ANALYTICAL DATA
PARAMETER REFERENCE INFORMATION
QUERY
QUERY
QUERY
QUERY
REPORT GENERATION
ANNUAL REPORT
ACTION ALERT

FIG.2

MOE - DRINKING WATER ASSESSMENT PROGRAM (DWSP)

(B2001P) PARAMETER REFERENCE
BENZENE

SOURCE	FROM	TO	METHOD	TARG	UNIT	NOTE
EPA	C 86/04		NOMETH	.00	063000 UG/L	RMCL
EPAA	C 80/11		NOMETH	6.60	063000 UG/L	
FERC	C 84/05		NOMETH	1.00	063000 UG/L	
WHO	C 84/01		NOMETH	10.00	064000 UG/L	

DESCRIPTION: NAME: BENZENE
CAS#: 71432
MOLECULAR FORMULAE: C_6H_6
DETECTION LIMIT: (FOR METHOD POCODO) 0.05 UG/L
SYNONYMS: BENZOLE, COAL NAPHTHA, CARBON OIL (27), CYCLOHEXATRIENE (41)
CHARACTERISTICS: COLOURLESS TO LIGHT YELLOW, MOBILE, NON-POLAR LIQUID, OF HIGHLY REFRACTIVE NATURE, AROMATIC, VAPOURS BURN WITH SMOKING FLAME (30)
PROPERTIES:
SOLUBILITY IN WATER: 1780-1800 MG/L AT 25 DEG C (41)
THRESHOLD ODOUR: NO DATA
THRESHOLD TASTE: 0.5 MG/L IN WATER (39)
ENVIRONMENTAL FATE: MAY BIOACCUMUALTE IN LIVING ORGANISMS, APPEARS TO BIOACCUMULATE IN ANIMAL TISSUES THAT EXHIBIT HIGH LIPID CONTENT OR ARE MAJOR METABOLIC SITES (LIVER, BRAIN), SMALL QUANITIES EVAPORATE FROM SOIL OR DEGRADE QUICKLY
SOURCES: PETROLEUM REFINING, SOLVENT RECOVERY, COAL TAR DISTILLATION, FOOD PROCESSING, TANNING.
USES: PREPERATION OF ETHYL BENZENE USED AS A STYRENE MONOMER, DETERGENTS, NYLON, AS INTERMEDIATE IN PESTICIDE PRODUCTION, SOLVENT IN RUBBER INDUSTRY, DEGREASING AND CLEANSING AGENT, GASOLINE.
TOXICITY: RATING 4 (VERY TOXIC); ACUTE - IRRITATES MUCOUS MEMBRANES, SYMPTONS INCLUDE RESTLESSNESS, CONVULSIONS, DEPRESSION, RESPIRATORY FAILURE; CHRONIC - ANEMIA AND LEUKEMIA (45).
CARINOGENICITY: HUMAN CARCINOGEN AND MUTAGEN
REMOVAL: GAC ADSORPTION, PRECIPITATION WITH ALUM FOLLOWED BY SEDIMENTATION, COAGULATION AND FLOCCULATION, SOLVENT EXTRACTION, OXIDATION (41).
MOLECULAR WEIGHT: 78.12 GRAMS
MELTING POINT: 5.5 DEGREES C (27)
BOILING POINT: 80.1 DEGREES C (27)
SPECIFIC GRAVITY: 0.879 AT 20 DEGREES C (27)
VAPOUR PRESSURE: 100 MM AT 26.1 DEGREES C
HENRY'S LAW CONSTANT: 0.00555 ATM M_3/MOLE
LOG OCT./WATER PAR.COEFF: K=1.0 1/N=1.6 R=.97 PH=5.3

Appendix B

DWSP SAMPLING GUIDELINE

i) RAW and TREATED at PLANT

General Chemistry	-500 mL clear plastic bottle -rinse bottle with sample three times and discard water -fill to line
Bacti	-250 mL clear glass bottle with white seal on cap -do <u>not</u> rinse bottle; preservative has been added -avoid touching bottle neck or inside of cap -fill to top of red label as marked
Metals	-500 mL clear plastic bottle with white lid -rinse bottle and cap three times, discard -fill to line -add 10 drops nitric acid (Caution: HNO_3 is corrosive)
Volatiles (OPOPUP)	-250 mL clear glass bottle -do <u>not</u> rinse bottle -tilt bottle when filling -fill bottle completely; there should be no air bubbles.
Organic (OWOC),(OWTRI),(OAPAHX)	-1 liter brown glass bottle per scan -do <u>not</u> rinse bottle -fill to approx. 1" from top -when 'special pesticides' are requested three extra bottles per sample must be submitted
Cyanide	-500 mL clear plastic bottle -do <u>not</u> rinse bottle -fill to approx. 1" from top -add 10 drops sodium hydroxide (Caution: NaOH is corrosive)

Mercury	-250 mL clear glass bottle -rinse bottle and cap three times, discard then fill to top of label -add 20 drops each nitric acid and potassium dichromate (Caution: HNO_3 and $KCrO_7$ corrosive)
Phenols	-250 ml clear glass bottle -do <u>not</u> rinse bottle -fill to top of label as marked

<u>Steps</u>

1. Let cold water tap run for several minutes.
2. Record time in submission sheet.
3. Record teperature on submission sheet.
4. Fill up all bottles as per instructions.
5. Record chlorine residuals (free, combined and total for treated water only), turbidity and pH on submission sheet.

ii) Distribution Samples (standing water)

General Chemistry	-500 mL clear palstic bottle -rinse bottle with sample three times and discard -fill to line
Metals	-500 mL clear plastic bottle with white lid -rinse bottle and cap three times, discard -fill to line -add 10 drops nitric acid (Caution: HNO_3 is corrosive)

Steps:

1. Record time on submission sheet.
2. Place bucket under tap and open cold water.
3. Fill to predetermined volume.
4. After mixing the water, record the temperature on the submission sheet.
5. Fill general chemistry and metals bottles.
6. Record chlorine residuals (free, combined and total), turbidity and pH on submission sheet.

iii) Distribution Samples (free flow)

General Chemistry	-500 mL clear plastic bottle -rinse bottle with sample three times and discard water -fill to line
Bacti	-250 mL clear glass bottle with white seal on cap -do not rinse bottle; preservative has been added -avoid touching bottle neck or inside of cap -fill to top of red label as marked
Metals	-500 mL clear plastic bottle with white lid -rinse bottle and cap three times, discard -fill to line -add 10 drops nitric acid (Caution: HNO_3 is corrosive)
Volatiles (OPOPUP)	-250 mL clear glass bottle -do not rinse bottle; preservative has been added -tilt bottle when filling -fill bottle completely; there should be no air bubbles
Organic (OWOC),(OWTRI)	-1 liter brown glass bottle per scan -do not rinse bottle: preservative has been added -fill to approx. 1" from top
Cyanide	-500 mL clear plastic bottle -do not rinse bottle: preservative has been added -fill to approx. 1" from top -add 10 drops sodium hydroxide (Caution: NaOH is corrosive)
Mercury	-250 mL clear glass bottle -rinse bottle and cap three times, discard then fill to top of label -add 20 drops each nitric acid and potassium dichromate (Caution: HNO_3 and $KCrO_7$ corrosive)

Steps:

1. Record time on submission sheet.
2. Let cold water flow for five minutes.
3. Record temperature on submission sheet.
4. Fill all bottles as per instructions.
5. Record chlorine residuals (free, combined and total), tubidity and pH on submission sheet.

Table 6

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE
BACTERIOLOGICAL			
FECAL COLIFORM MEMBRANE FILTRATION	CT/100ML	0	0 (A1)
STANDARD PLATE COUNT MEMBRANE FILTRATION	CT/ML	0	500/ML(A1)
TOTAL COLIFORM MEMBRANE FILTRATION	CT/100ML	0	5/100mL(A1)
TOTAL COLIFORM BACKGROUND MF	CT/100ML	0	N/A
CHLOROAROMATICS			
HEXACHLOROBUTADIENE	NG/L	1.000	450. (D4)
1,2,3-TRICHLOROBENZENE	NG/L	5.000	10000 (I)
1,2,3,4-TETRACHLOROBENZENE	NG/L	1.000	10000 (I)
1,2,3,5-TETRACHLOROBENZENE	NG/L	1.000	10000 (I)
1,2,4-TRICHLOROBENZENE	NG/L	5.000	10000 (I)
1,2,4,5-TETRACHLOROBENZENE	NG/L	1.000	38000 (D4)
1,3,5-TRICHLOROBENZENE	NG/L	5.000	10000 (D4)
HEXACHLOROBENZENE	NG/L	1.0	10. (C1)
HEXACHLOROETHANE	NG/L	1.000	1900. (D4)
OCTACHLOROSTYRENE	NG/L	1.000	N/A
PENTACHLOROBENZENE	NG/L	1.000	74000 (D4)
2,3,6-TRICHLOROTOLUENE	NG/L	5.000	N/A
2,4,5-TRICHLOROTOLUENE	NG/L	5.000	N/A
2,6,A-TRICHLOROTOLUENE	NG/L	5.000	N/A
CHLOROPHENOLS			
2,3,4-TRICHLOROPHENOL	NG/L	50.	N/A
2,3,4,5-TETRACHLOROPHENOL	NG/L	50.	N/A
2,3,5,6-TETRACHLOROPHENOL	NG/L	10.	N/A
2,4,5-TRICHLOROPHENOL	NG/L	50.	2600000 (D4)
2,4,6-TRICHLOROPHENOL	NG/L	20.	2000. (B4)
PENTACHLOROPHENOL	NG/L	50.	30000. (B4)
CHEMISTRY (FLD)			
FIELD COMBINED CHLORINE RESIDUAL	MG/L	N/A	N/A
FIELD FREE CHLORINE RESIDUAL	MG/L	N/A	N/A
FIELD TOTAL CHLORINE RESIDUAL	MG/L	N/A	N/A
FIELD PH	DMSNLESS	N/A	6.5-8.5(A4)
FIELD TEMPERATURE	°C	N/A	<15 °C(A1)
FIELD TURBIDITY	FTU	N/A	1.0 (A1)
CHEMISTRY (LAB)			
ALKALINITY	MG/L	.200	30-500(A4)
CALCIUM	MG/L	.100	100. (F2)
CYANIDE	MG/L	.001	.20(A1)
CHLORIDE	MG/L	.200	250. (A3)
COLOUR	TCU	.5	5.0 (A3)
CONDUCTIVITY	UMHO/CM	1.	400. (F2)
FLUORIDE	MG/L	.01	2.4 (A1)
HARDNESS	MG/L	.50	80-100(A4)
MAGNESIUM	MG/L	.05	30. (F2)